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ABSTRACT

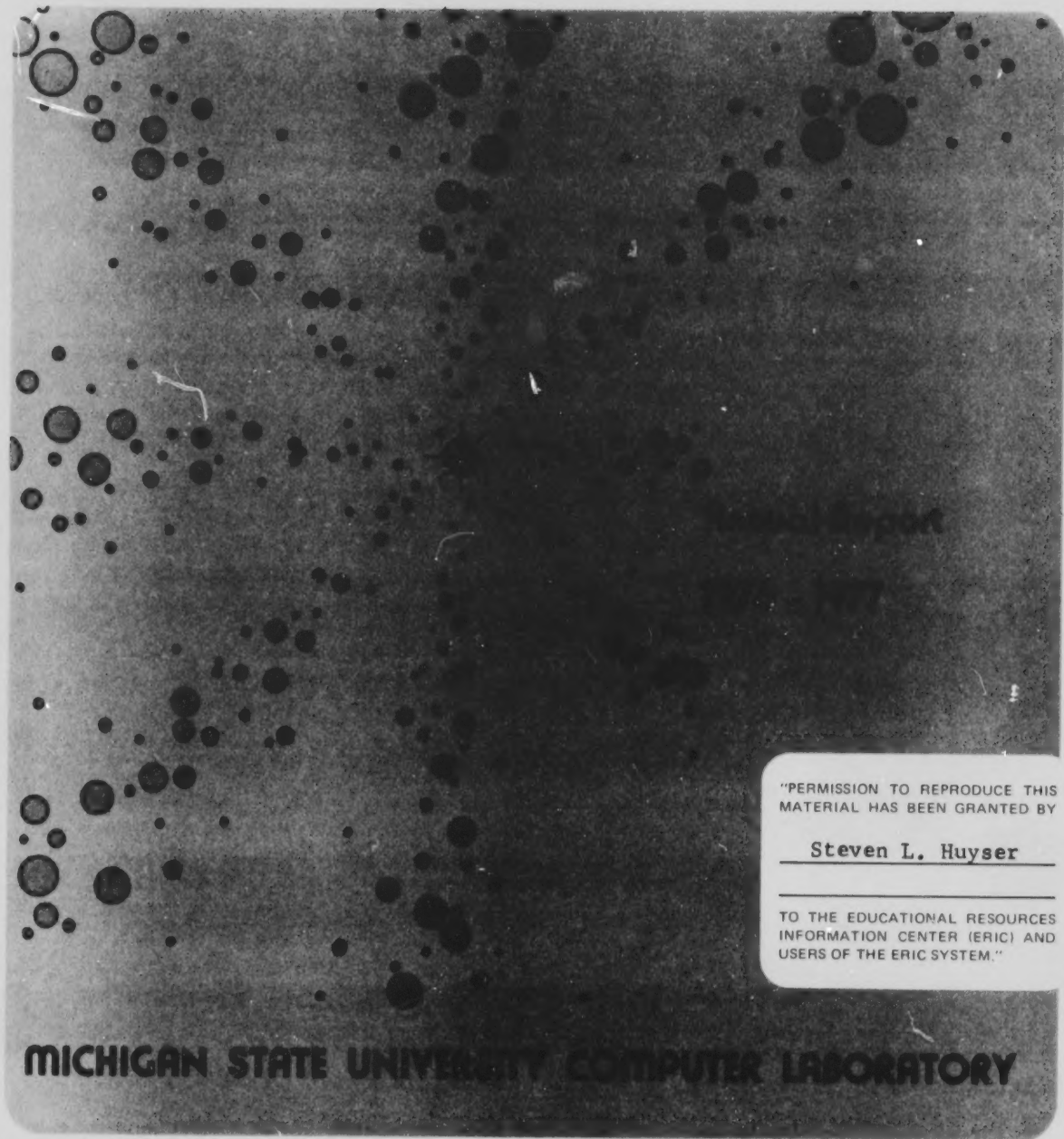
The Computer Laboratory, founded in 1956, provides instructional and research computing services to the students, faculty, and staff at Michigan State University; this report reviews the activities and summarizes usage of its services during the 1976-1977 fiscal year. The organizational structure is charted, facilities and services are detailed, and financial documentation is provided. Activities are reported in the areas of systems development, user information support, applications programming, and engineering services. Appendices include information on the computer advisory committee and subcommittees, an extensive analysis of computer usage, and computer service rates. (RAO)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

MICHIGAN STATE UNIVERSITY COMPUTER LABORATORY

IR006609

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Introduction

The Computer Laboratory, founded in 1956, provides instructional and research computing services to the students, faculty and staff at Michigan State University. The Computer Laboratory operates a Control Data Corporation 6500 computer system. Remote batch and interactive terminal service is provided by the MSU 6500 with batch and interactive terminals located across campus. A staff of some 65 people supports the Computer Laboratory's activities. This report reviews the activities of the Computer Laboratory during the 1976-1977 fiscal year and summarizes usage of the services during this period.

1.0

Organization

The Director of the Computer Laboratory is responsible for all aspects of the Computer Laboratory's operation and reports administratively to the Director of Academic Services.

The University Computer Advisory Committee provides general policy recommendations for the Computer Laboratory. Three subcommittees, Operations, Users', and Finance, operate under the aegis of the University Computer Advisory Committee. These subcommittees provide advice and guidance that is vital to the operation of the Computer Laboratory. The membership for all of these committees as well as the charter for each is given in Appendix A. Each of the subcommittees met many times during the year to consider matters of immediate as well as long-term concern to the Computer Laboratory.

The organization of the Computer Laboratory is given in Figure 1. Table 1 gives the number of people employed in the various groups within the Computer Laboratory and provides a comparison with the previous year.

2.0

Facilities and Services

This chapter is not intended to describe all facilities and services provided. That information is available in the Facilities and Policies Handbook. This chapter is intended to show how those facilities and services have changed during the 1976-77 fiscal year.

2.1

Hardware

The hardware configuration for the MSU 6500 is shown in Figure 2. The hardware characteristics for the storage and peripheral components of the MSU 6500 are given in Table 2. In addition to this equipment there are four batch terminals located in the Physics Building, the Chemistry Building, the Engineering Building, and the Physical Plant Building, and many interactive terminals.

During the 1976-77 fiscal year, the following equipment was acquired: three disk drives, one 9-track tape drive, three additional 7-track tape drives and equipment for the Front-End computer system. The addition of this equipment allowed us to increase permanent file space, allow exchange of 9-track tapes with IBM sites, decrease waiting time for tape mounts, increase the number of interactive lines available and add 1200 baud interactive service.

Figure 1
Computer Laboratory Organization

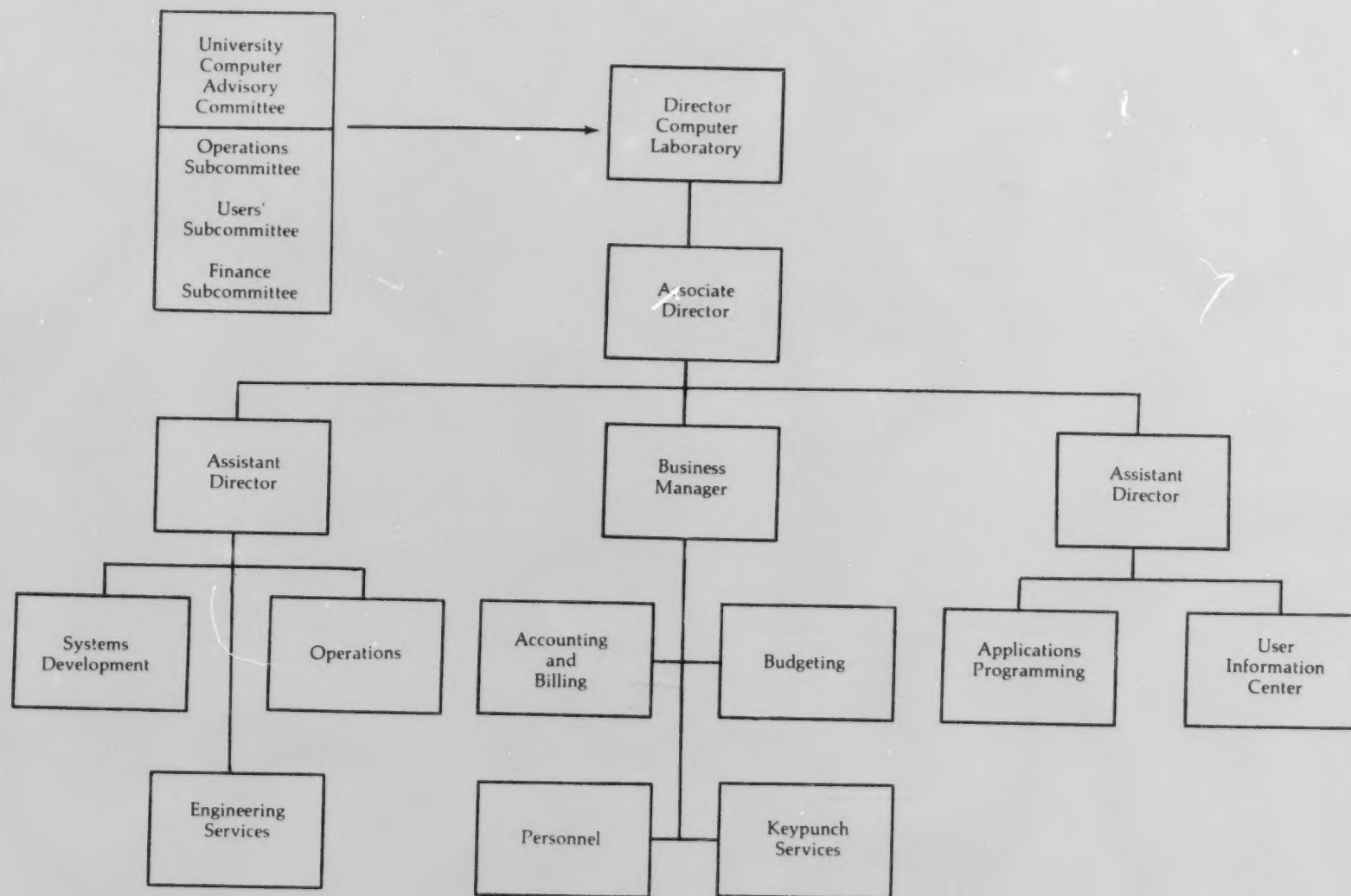


Table 1
Computer Laboratory Personnel (FTE as of June 30, 1977)

	Academic		Admin/Prof.		Cl./Tech.		Total		Students ²		Total	
	1977	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977	1976
Operations and I/O	.3	--	4.0	4.0	13.2 ¹	13.7	17.5	17.7	1.7	.7	19.2	18.4
Systems	2.3	2.6	8.0	8.0	1.0	1.0	11.3	11.6	2.7	3.2	14.0	14.8
Engineering Services	.3	--	3.0	2.0	3.0	2.0	6.3	4.0	.6	.1	6.9	4.1
User Information Center	.7	2.7	6.0	5.0	2.0	2.0	8.7	9.7	1.6	2.0	10.3	11.7
Office	1.0	.9	3.0	3.2	01.5	2.5	5.5	6.6	.5	.5	6.0	7.1
Keypunch	--	--	--	--	3.7	4.0	3.7	4.0	--	--	3.7	4.0
Applications Programming	.1	.3	4.0	4.0	0.5	0.5	4.6	4.8	.7	.7	5.3	5.5
Total	4.7	6.5	28.0	26.2	24.9	25.7	57.6	58.4	7.8	7.2	65.4	65.6

¹Includes overtime of 1.1 operators.

²Calculated by dividing entry level job salary into total dollars expended.

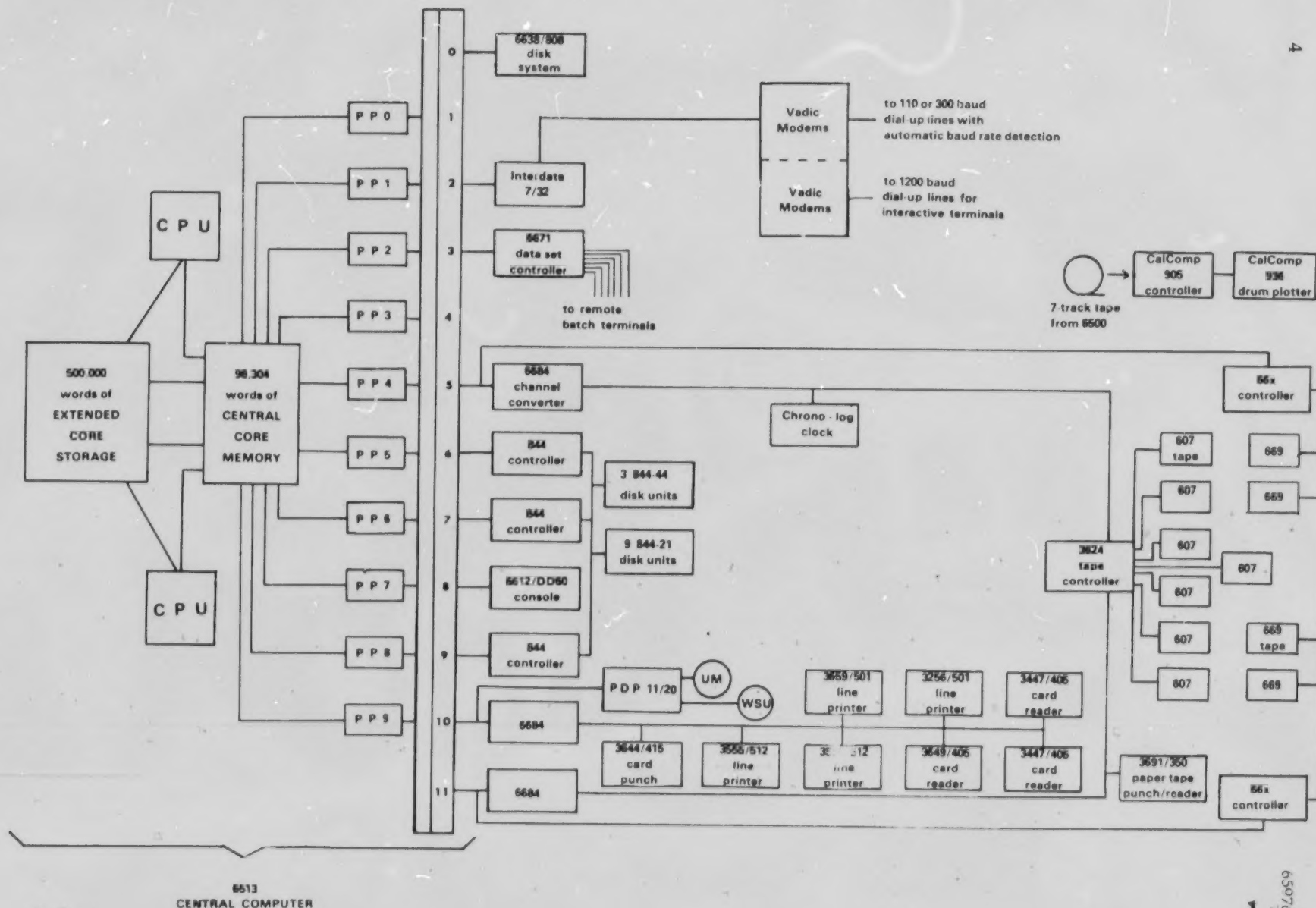


Figure 2
MSU 6500 Connection Diagram

Table 2

MSU 6500 HARDWARE CHARACTERISTICS

Device	Model Number	Device Characteristics	Qty.	Current Use
Disk File	CDC 808-2	132 million characters of storage; average access time of 107.5 milliseconds; transfer rate of 1.68 million characters per second	1	System files; scratch files; job swapping; permanent file storage
Disk System	CDC 7054	Disk Controllers	3	Permanent file storage; job swapping; scratch files
	CDC 844-2	Nine spindles, 1.04 billion characters of storage, average access time of 38.2 milliseconds, transfer rate of 462,000 characters per second	9	
	CDC 844-44	Two spindles 474.5 million characters of storage, average access time of 38.2 milliseconds, transfer rate of 462,000 characters per second	2	
Extended Core Storage (ECS)	CDC 6634	500,000 60-bit word of core storage; transfer rate of 10,000,000 words per second	1	Job swapping; system libraries; system tables
Card Reader	CDC 405	1200 cards/minute	3	Central site card reading
Card Punch	CDC 415	250 cards/minute	1	Central site card punching
Line Printer	CDC 512	1200 lines/minute	2	Central site printing
Line Printer	CDC 501	1000 lines/minute	1	Central site batch terminal printing
Tape Drive	CDC 607	7 track; 150 ips; density/transfer rate = 200 bpi/30 KC, 556 bpi/83.3 KC, 800 bpi/120KC	7	Magnetic tape processing
	CDC 669	9 track; 150 ips; density/transfer rate = 800 bpi/120 KC, 1600 bpi/240 KC	2	Magnetic tape processing
Communications Disk Concentrator	ADS 660	29-300 baud ports, 13-110 baud ports from VADIC 307C modems	3	Interactive terminal communications
Communications Multiplexor	CDC 6671	1-16 ports, 2000-4800 baud	1	Remote batch and interactive terminal communications
Front-End System		7-1200 baud interactive ports via VADIC 3405 modems and hardwired; 26-110/300 Auto Baud Lines via VADIC 307C modems and hardwired	1	Communication front-end system for the 6500 computer

2.2 Software

The MSU 6500 operates under a modified CDC SCOPE system named the SCOPE/HUSTLER operating system. Table 3 lists the major software components available to users on the MSU 6500.

Table 3
Software Support

Name	Title	Support ¹
APEX	Linear Programming System	II
APL	APL Language Processor	II
APLIB	User Library Maintenance	III
AUTHORF	Authorization File Maintenance	I
BASIC	BASIC Language Processor	I
8-Bit Subroutines	IBM-CDC Conversion Routine	I
CALCOMP	CALCOMP Plotting Library	II
COBOL	COBOL Compiler	I
COMPASS	6500 Assembly Language	I
CRM	Cyber Record Manager	I
DMS-170	Database Management System	I
EDITOR	Interactive Text EDITOR	I
EISPACK	Eigen Analysis Package	III
FORM	File Organization Record Manager	I
FTN	FORTRAN Extended Compiler	I
GASP	Simulation Package	III
GCS	Graphics Compatibility System	II
HAL	HUSTLER Auxiliary Library	I
IMSL	International Math/Stat Library	I
KWIC	Key Word In Context	III
LIBEDIT	Loader Library Maintenance	I
LISP	List Processing Language	III
MIMIC	Ordinary Differential Equation Solver	III
MNF	Minnesota FORTRAN Compiler	I
NETFLOW	Network Flow Analyzer	III
PASCAL	PASCAL Language Compiler	II
PERTTIME	PERT Analyzer	III
SCOPE/HUSTLER	MSU 6500 Batch and Interactive Oper. System	I
SIMULA	Simulation/Algorithmic Language	III
SNOBOL	String Manipulation Language	III
SORTMRG	Sorting/Merging Package	I
SPSS	Statistical Package for the Social Sciences	I
SPURT	Simulation Package	III
STAT	Statistical Analysis System	II
TEKTRONIX	Graphics Software Package	II
UPDATE	Library Preparation and Maintenance	I

¹For a full discussion of support levels, see section 7.6.1 of the Facilities and Policies Handbook.

2.3 Services

The computing services provided to users are summarized in several tables, with a monthly breakdown of services in Appendix B.

The table in Appendix C gives the percentage use by each department within a college. The percentages are given for both MSU 6500 use and Merit Network use, with and without the Computer Laboratory use. The corresponding percentage is also given for the preceding year.

The total percentage use for various colleges is given by Table 4 and illustrated by Figure 3. Also given are the corresponding percentages for the previous two years and the percentage change in usage.

Table 4
Computer Service Percentage Usage by College

	76-77	Change ¹	75-76	Change ¹	74-75
Natural Science	35.25%	31.36%	32.77%	-0.15%	36.90%
Agriculture	23.20	48.33	19.04	34.91	15.87
Engineering	14.86	1.53	17.88	36.93	14.68
Social Science	7.60	-10.96	10.42	15.5	10.14
Human Medicine	5.12	6.33	5.88	32.13	5.00
Education	3.26	-117.78	1.83	-5.81	2.18
Business	3.13	-16.36	4.58	-18.53	6.31
Lyman Briggs	2.59	9.53	2.88	-12.19	3.69
Communication Arts	1.60	30.73	1.58	13.62	1.56
Osteopathic Medicine	1.36	32.25	1.25	-5.12	1.49
Urban Development	0.41	-42.37	0.88	-9.06	0.62
University College	0.90	213.07	0.35	-19.71	0.49
Human Ecology	0.33	-15.53	0.47	-31.99	0.78
Veterinary Medicine	0.16	67.04	0.12	3.16	0.13
Arts and Letters	0.15	168.44	0.07	-50.70	0.16
TOTAL	100.00% ²		100.00%		100.00%

Additional tables in Appendix C indicate computer usage by source of service, amount of interactive service, and utilization of central memory, central processors and permanent files.

¹ Indicates an increase or decrease in usage from fiscal 74-75 to 75-76.

² Indicates an increase or decrease in usage from fiscal 75-76 to 76-77.

³ The total dollar value of computer service used by these colleges is:

76-77	\$2,380,098
75-76	\$1,948,548
74-75	\$1,733,282

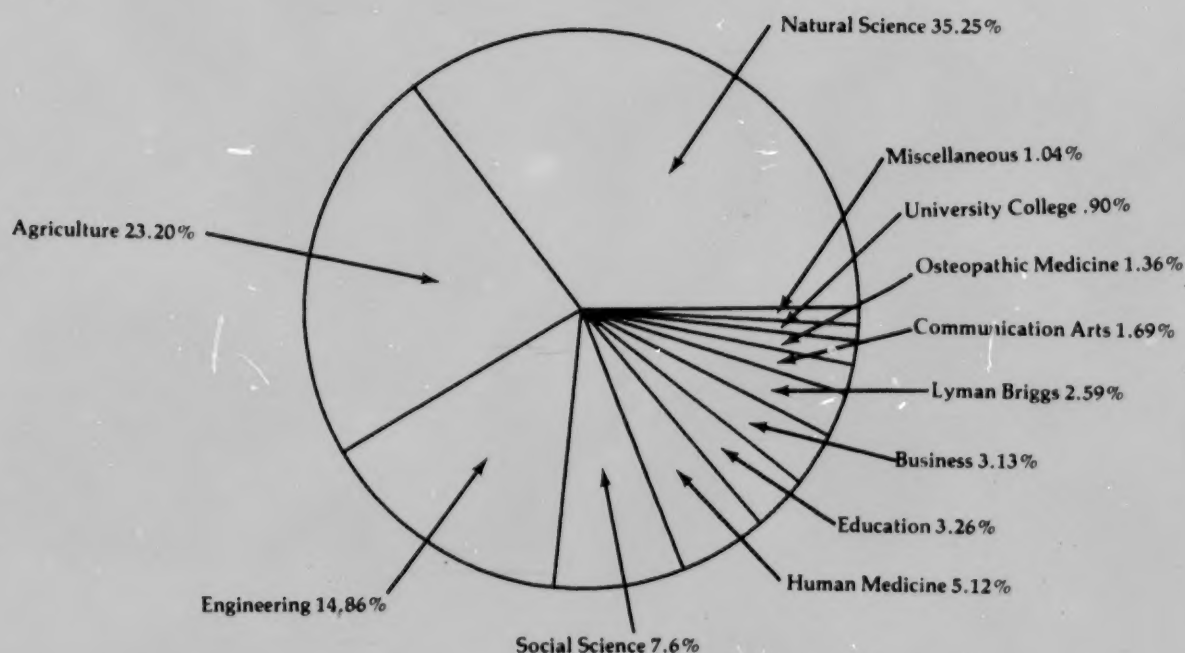


Figure 3
Computer Service: Percentage Usage by College

As indicated by the first table in Appendix C, the four departments with the greatest use of the MSU 6500 during the 1976-77 fiscal year were:

Table 5

Computer Usage-High Use Departments

	76-77	75-76	74-75	73-74	72-73
Physics	17.57%	18.75%	23.50%	26.33%	29.67%
Chemistry	7.16	4.87	4.55	4.97	5.91
Computer Science	7.14	10.02	9.12	10.54	12.64
Agricultural Economics	6.24	7.29	5.73	5.91	4.49

3.0 Finances

The operating funds for the Computer Laboratory are derived from three main sources: the University General Fund, revenues from off-campus computer services and revenues from on-campus computer services. The University through General Fund money budgeted to the Computer Laboratory subsidizes up to 87.5 percent of a college's research or class usage not supported by other funds. Figure 4 illustrates the distribution of these funds with the exact figures being given in Table 6. A schedule of rates is included in Appendix D.

Computer Laboratory expenditures are concentrated in the areas of: personnel, CDC maintenance costs, supplies and services. Figure 5 illustrates the distribution of expenditures with the exact figures appearing in Table 7.

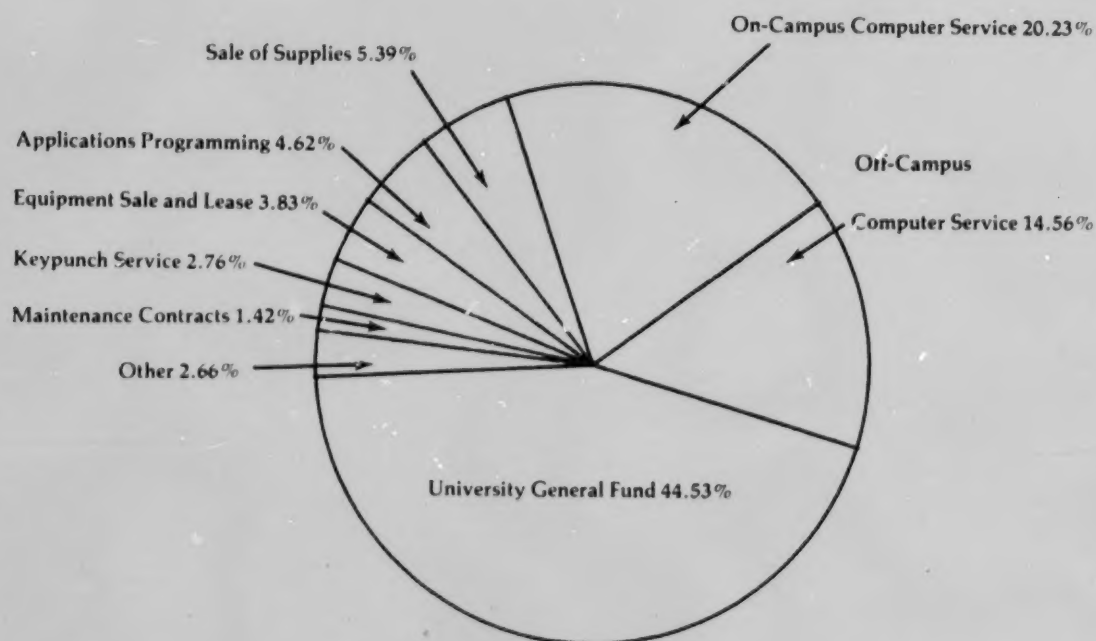


Figure 4
Source of Operating Funds

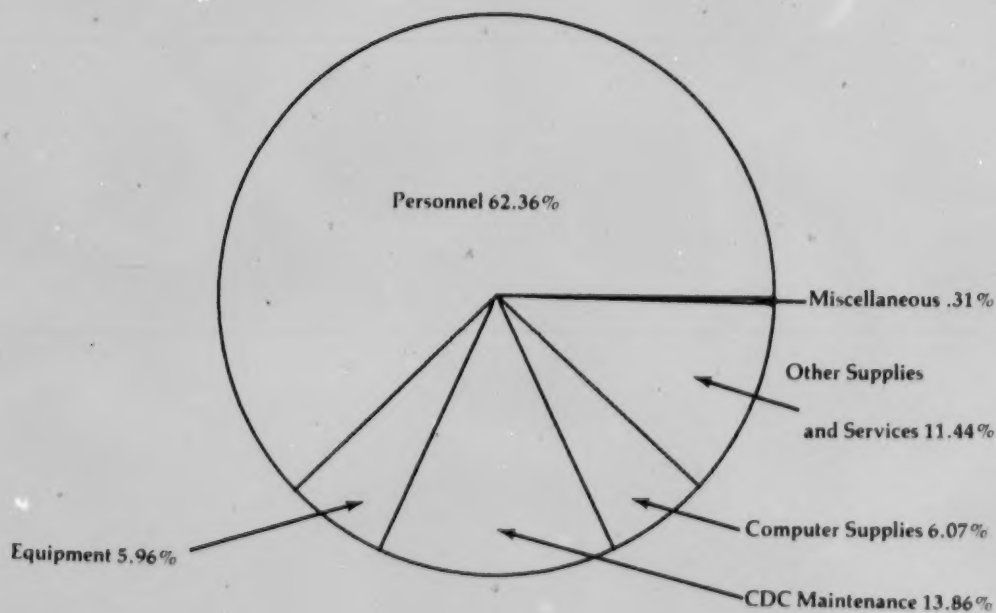


Figure 5
Expenditure of Operating Funds

Table 6
Source of Operating Funds

	1974-75		1975-76		1976-77	
University General Fund	\$ 709,475.51	49.62%	\$ 768,211.20	49.03%	\$ 786,576.63	44.53%
Off-Campus Computer Service	151,509.38	10.59%	171,344.89	10.94%	257,171.25	14.56%
On-Campus Computer Service	249,010.75	20.56%	314,959.02	20.11%	357,327.64	20.23%
Sale of Supplies	102,115.18	7.14%	91,775.86	5.86%	95,164.39	5.39%
Applications Programming	81,537.74	5.70%	75,415.13	4.81%	81,537.74	4.62%
Equipment Sale and Lease	31,873.40	2.23%	42,955.57	2.74%	67,595.99	3.83%
Keypunch Service	40,133.54	2.81%	48,832.22	3.12%	48,832.22	2.76%
Maintenance Contracts	11,333.45	0.79%	18,981.94	1.21%	24,995.66	1.42%
Other	20,784.74	1.45%	34,077.69	2.18%	47,054.17	2.66%
Total Income	\$1,429,939.79	100.00%	\$1,566,553.52	100.00%	\$1,766,255.69	100.00%

Table 7

Expenditure of Operating Funds

	1974-75		1975-76		1976-77	
Personnel	\$ 844,115.30	60.16%	\$ 881,263.99	63.91%	\$ 923,676.32	62.36%
Equipment Purchase ¹	92,976.30	6.63%	50,662.09	3.67%	88,320.99	5.96%
CDC Maintenance	177,688.22	12.66%	192,571.50	13.97%	205,266.99	13.86%
Computer Supplies	130,777.32	9.32%	92,100.24	6.68%	89,841.67	6.07%
Other Supplies and Services	152,323.42	10.85%	154,966.77	11.24%	169,464.33	11.44%
Miscellaneous	5,402.62	0.38%	7,331.85	0.53%	4,652.32	0.31%
Total Expenditures	\$1,403,283.51	100.00%	\$1,378,896.44	100.00%	\$1,481,222.62	100.00%

¹Major computer equipment purchases not included in this category.

The difference between total operating income and total operating expense has typically been used to purchase major items of computer equipment. This year that included three disk drives, one 9-track tape drive, three additional 7-track tape drives and equipment related to the Front-End computer system. Appendix D includes the amortization history of the 6500 system.

4.0 Activities

This section summarizes the activities of the various groups within the Computer Laboratory:

- Operations and Input/Output

- Systems Development

- User Information Center

- Applications Programming

- Engineering Services

4.1 Operations and Input/Output

The Operations Group is responsible for the operation and maintenance of the MSU 6500 and its associated hardware. This also includes operation of the Input/Output Services, maintenance of the Preparation Rooms, and operation of Plotting and Magnetic Tape Services.

The computer operators monitor and operate the CDC 6500 and its associated peripheral equipment. The operators also retrieve, assign and mount magnetic tapes as requested by users.

The Input/Output staff attends to the output devices—line printers, an incremental pen plotter, and a card punch—and files their output. The I/O personnel also assists users with the self-service peripheral equipment (card readers, line printer) and with the data preparation equipment (keypunches, card sorter, card reproducer and interpreter) as well as public interactive terminals. At the Service Window, the I/O staff handles requests for special input/output and magnetic tape services.

4.1.1 Organization

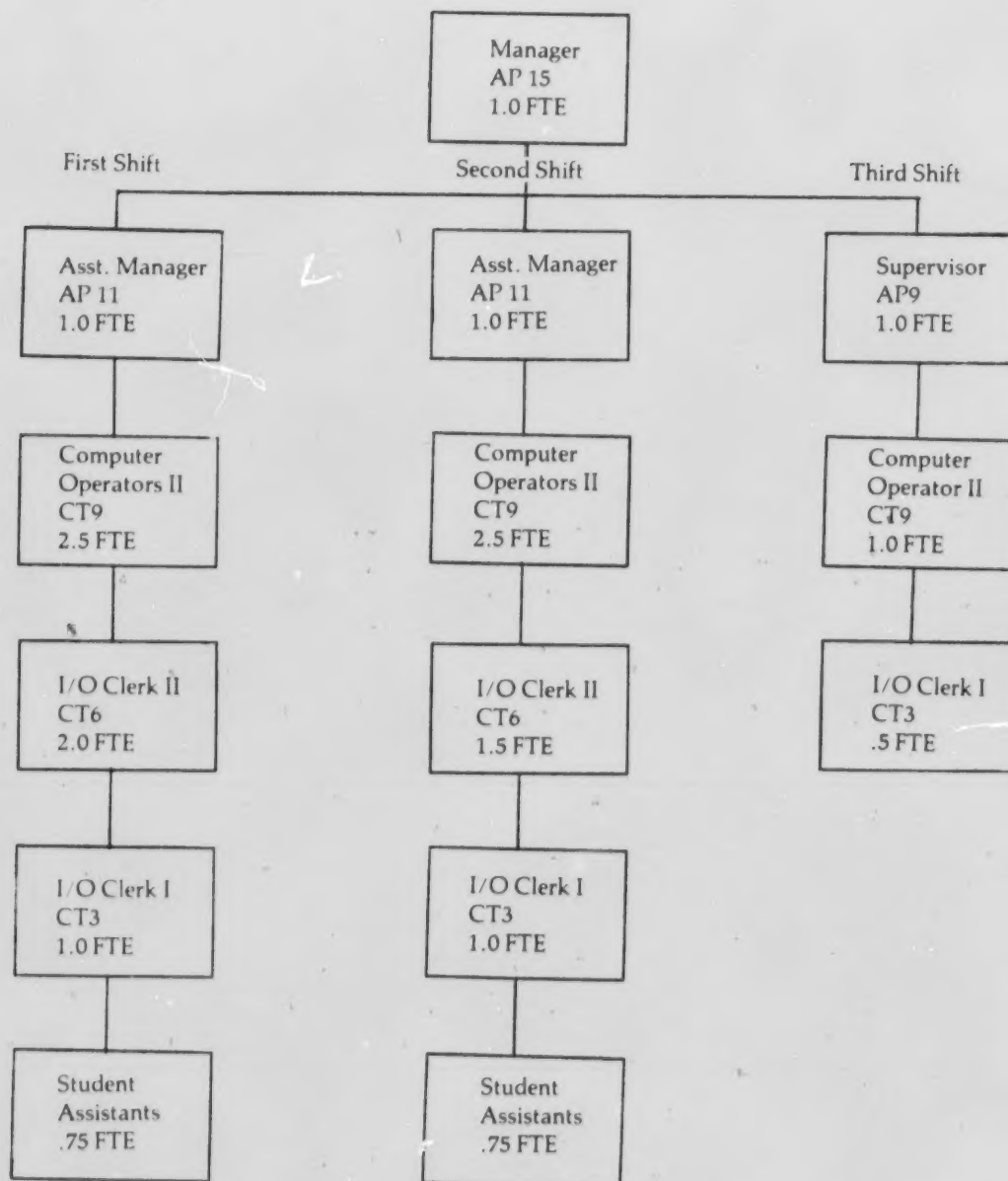


Figure 6
Operations Organizational Chart as of June 30, 1977

4.1.2

The Year in Review

The production schedule was changed to terminate production earlier on Tuesday and Thursday mornings while eliminating the interruptions on Wednesday and Friday mornings. This provided two long continuous production periods of 44 hours and 46 hours. While the total production hours per week did not change we had fewer idle downs and startup periods resulting in more efficient use of the system and improved turnaround time for very large jobs.

Several changes were made to the way jobs are scheduled for execution. These included:

1. Limiting the number of large jobs which could execute simultaneously.
2. Allowing the input queue priority of Normal Rate Group jobs to age into the Express Rate Group category.
3. Increasing the number of job classes (based on job cost) used to assign a job's minor priority in the input queue.
4. Limiting the numbers of Reduced Rate Group jobs which could execute simultaneously.
5. Only running Reduced Rate Group jobs when the system was idle.

The changes to the production schedule, job scheduling algorithm, and the continued restriction on Computer Laboratory usage during term end had the following effect:

1. Reduced turnaround time for large Normal Rate Group jobs to one or two days during the busy part of the term. This did not affect Express Rate Group usage which increased by 39% over last year.
2. Eliminated Reduced Rate Group access for large portions of each term resulting in a 33% drop in total Reduced Rate Group usage.

These changes to the production schedule did not improve the situation for typical student type jobs (Normal Rate Group with a job cost of less than 50 cents) as turnaround for these jobs, during prime time, averaged four to six hours at the ends of each term.

Total dollar usage (excluding Computer Laboratory use) increased by 26.8% over last year with interactive usage increasing by 31.5%. The total number of jobs run during 76-77 decreased by 4.0% while the number of interactive sessions increased by 3.1%. See Appendix C (tables: Computer Service—Dollar Usage by Source and Number of Jobs by Source). For a graphic representation of computer usage, refer to Figures 7, 8 and 9.

Hardware additions during the year included: three 7-track tape drives; the second 9-track tape drive, and two double density 844 disk drives.

The number of interactive access ports remained at 76 this year. The implementation of an interim front-end system allowed 27 of the 110 baud ports to be converted to 110-300 auto baud rate ports. This relieved some of the pressure for 300 baud access. The demand for 1200 baud service has not materialized. This is probably due to the cost of 1200 baud modems and the proportional increase

Figure 7
Total Jobs Executed Per Week—6500

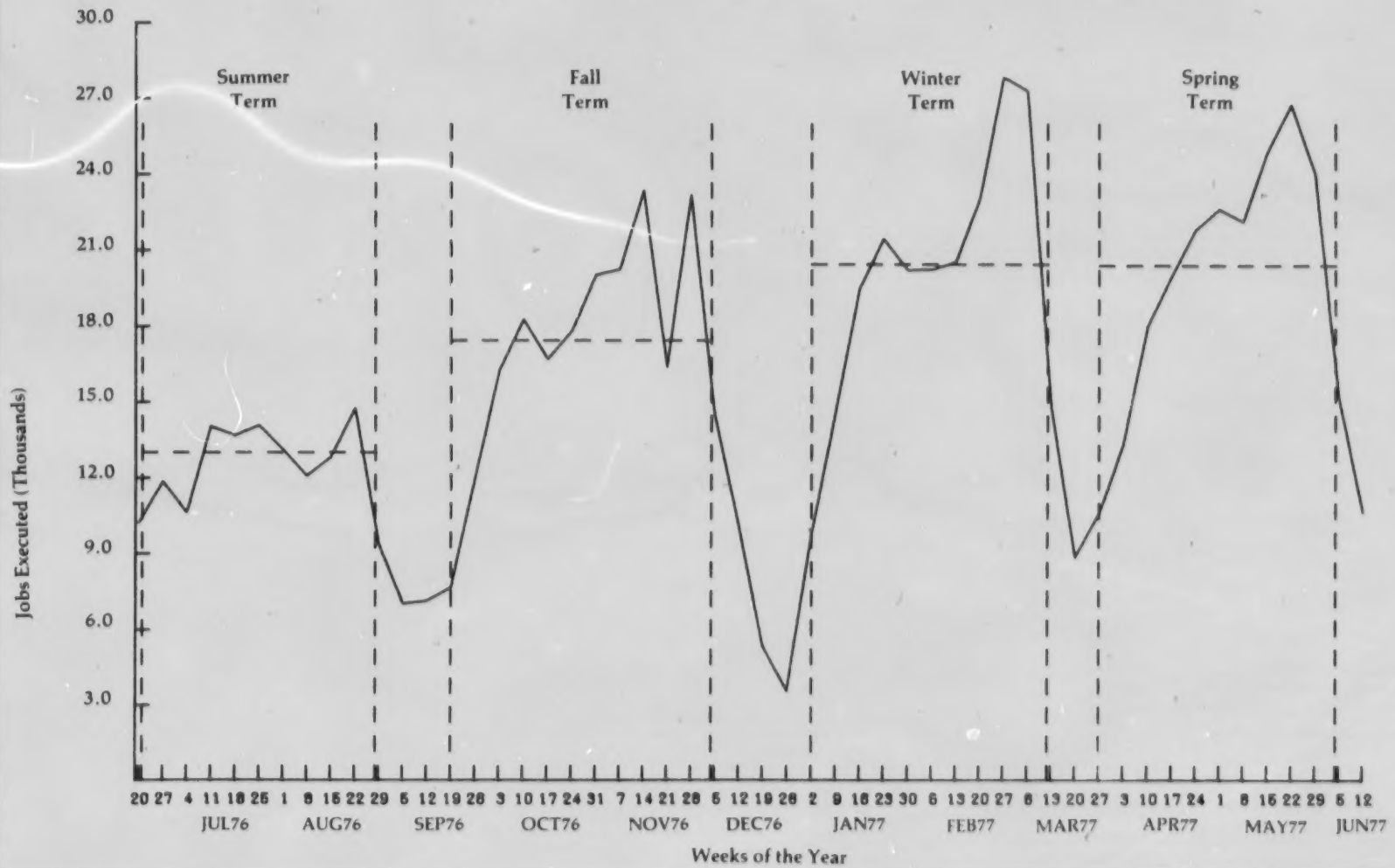


Figure 8
Total Dollar Usage Per Week—6500

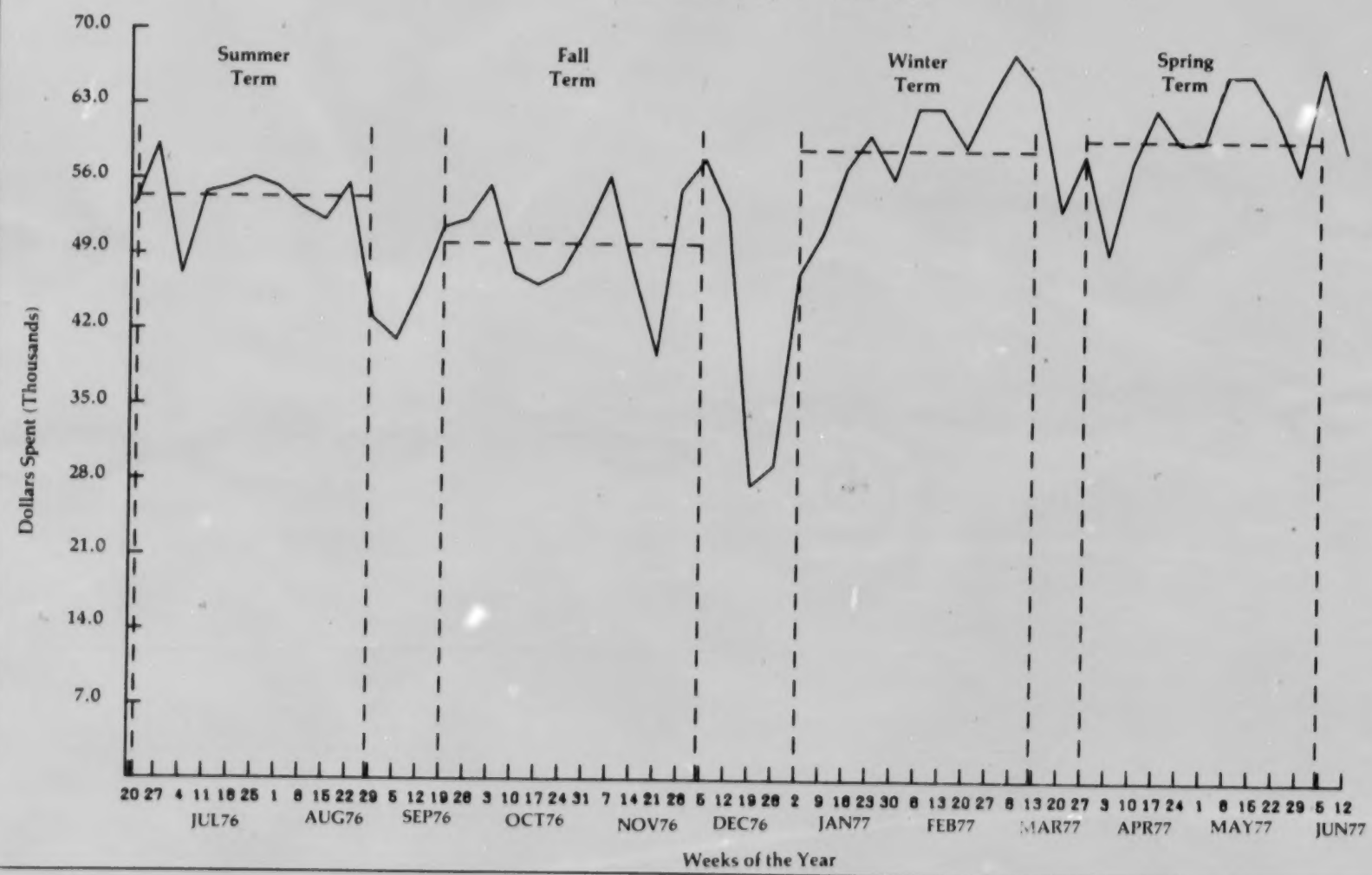
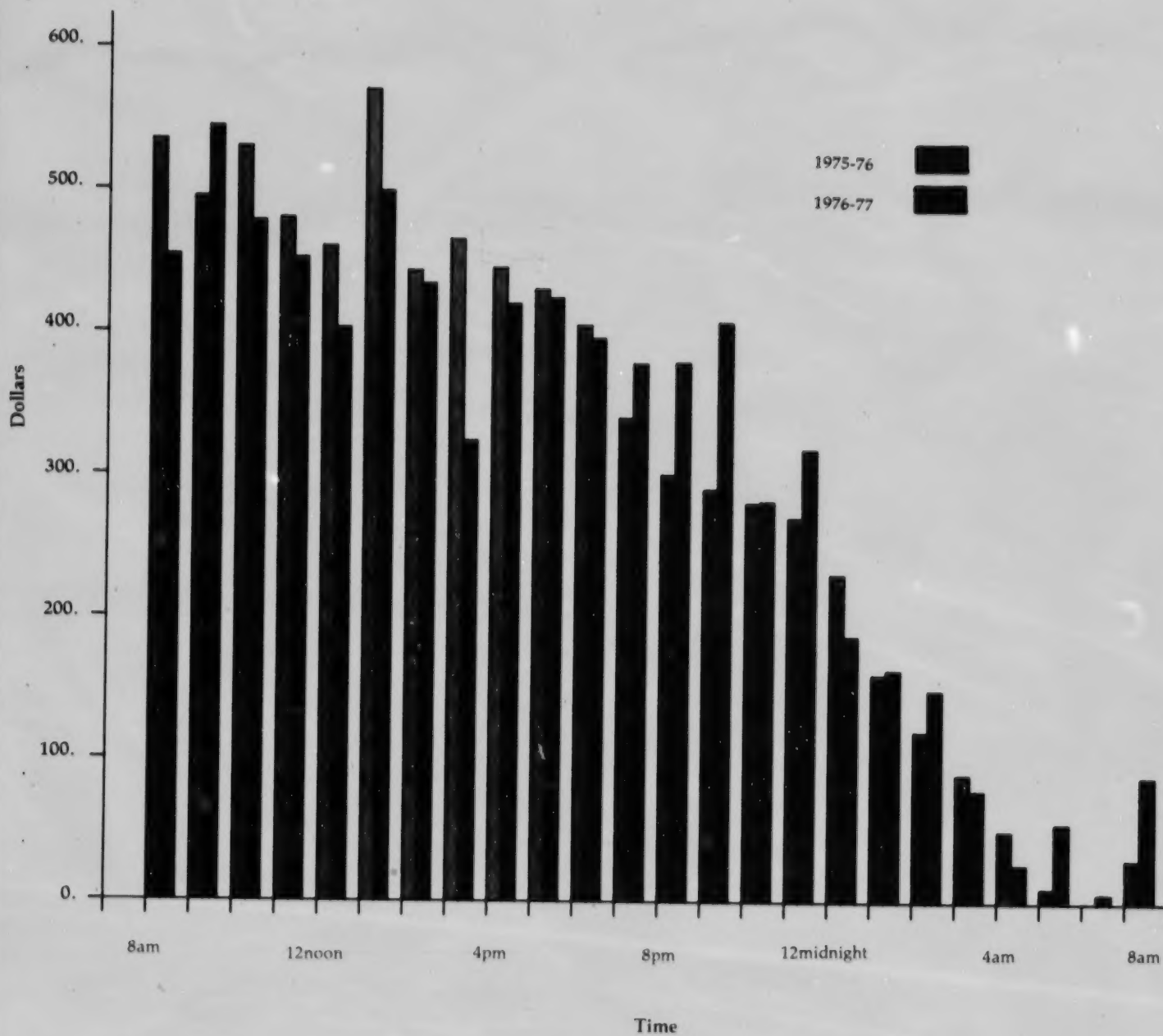


Figure 9
Average Dollar Usage Per Hour—6500



in connect time costs. Any additions to interactive access ports can only further degrade current interactive service and reduce batch throughput.

A monthly summary of interruptions to scheduled production is given in Table 8. It should be noted that this is the third straight year that the number of lost production hours has decreased. Table 9 summarizes interruptions by type. Hardware reliability continues to be satisfactory. The major improvement over last year was the reduction in software failures and the reduction in amount of time scheduled for software maintenance. The amount of production hours lost to failures of the environmental control equipment increased over last year.

Table 8
Interruptions to Scheduled Production

	Production Days	Scheduled Hours	Number of Interruptions	Total Hours Lost	Percentage Of Scheduled Hours Lost	Average Duration of Interruptions	Mean Time Between Interruptions ¹
July '76	28	484.8	20	10.1	2.1	30 Min	23.1 Hr
August	31	514.5	15	10.9	2.1	44 Min	32.2 Hr
September	27	482.2	21	14.4	3.0	41 Min	21.9 Hr
October	31	501.3	20	10.3	2.1	31 Min	23.9 Hr
November	28	468.5	20	16.7	3.6	50 Min	22.3 Hr
December	25	436.5	17	15.4	3.5	54 Min	24.2 Hr
January '77	29	490.7	15	10.5	2.1	42 Min	30.7 Hr
February	28	471.0	17	7.5	1.6	27 Min	26.2 Hr
March	31	538.8	20	12.5	2.3	38 Min	25.7 Hr
April	29	493.2	17	15.1	3.1	53 Min	27.4 Hr
May	30	499.0	16	4.4	.9	16 Min	29.4 Hr
June	30	514.8	25	13.4	2.6	32 Min	19.8 Hr
TOTAL '76-'77	347	5895.3	223	141.2	2.4	38 Min	26.3 Hr
TOTAL '75-'76	349	5815.7	388	295.2	5.1	46 Min	15.0 Hr
TOTAL '74-'75	354	5661.0	396	409.6	7.2	60 Min	14.2 Hr
TOTAL '73-'74	304	5655.0	390	613.9	10.9	94 Min	14.5 Hr

4.2 Systems Development

The Systems Development Group is responsible for maintaining and developing the software operating system for the CDC 6500 and the Interdata 7/32. Maintenance is also provided in conjunction with CDC for many dependent products, (FORTRAN, COBOL, SORT/MERGE, Query Update, etc.). This group has extensively expanded on existing CDC software to provide a unified, multi-processing system, SCOPE/HUSTLER, for batch and interactive service. This effort has provided considerably more efficient use of the computer's resources without significant changes to the user. SCOPE/HUSTLER allows more users to receive computer services than the standard CDC system.

This group also provides software support for non CDC hardware. This allows the Computer Laboratory to purchase less expensive (and more versatile) hardware.

¹In Production Hours.

Table 9

Types of Interruptions to Scheduled Production

Type of Interruption	No. of Interruptions	Total Hours Lost	Percent of Scheduled Hours Lost	Average Duration of Interruptions	Mean Time Between Interruptions ¹
Scheduled Interruptions					
Hardware	5	8.33	0.1%	1.70 Hr.	982.5
Software Maintenance	6	13.42	0.2%	2.20 Hr.	842.2
Environment	1	0.98	0.0%	0.98 Hr.	2947.6
Sub Total	12	22.73	0.4%	1.9 Hr.	453.5
PF Maintenance	6	1.55	0.0%	0.25 Hr.	842.2
Sub Total	18	24.28	0.4%	1.30 Hr.	310.3
Unscheduled					
Hardware	76	73.23	1.2%	0.96 Hr.	76.6
Software Failure	112	28.15	0.5%	0.25 Hr.	52.2
Software Maintenance	5	1.68	0.0%	0.33 Hr.	982.5
Environment	4	11.93	0.2%	3.00 Hr.	1179.0
Other	5	1.72	0.0%	0.35 Hr.	982.5
Sub Total	202	116.72	2.0%	0.58 Hr.	29.0
Prod Start/Term	3	0.17	0.0%	0.05 Hr.	1473.8
Sub Total	205	116.88	2.0%	0.56 Hr.	28.6
Total All Interruptions	223	141.17	2.4%	0.63 Hr.	26.3

¹ In Production Hours

4.2.1 Organization

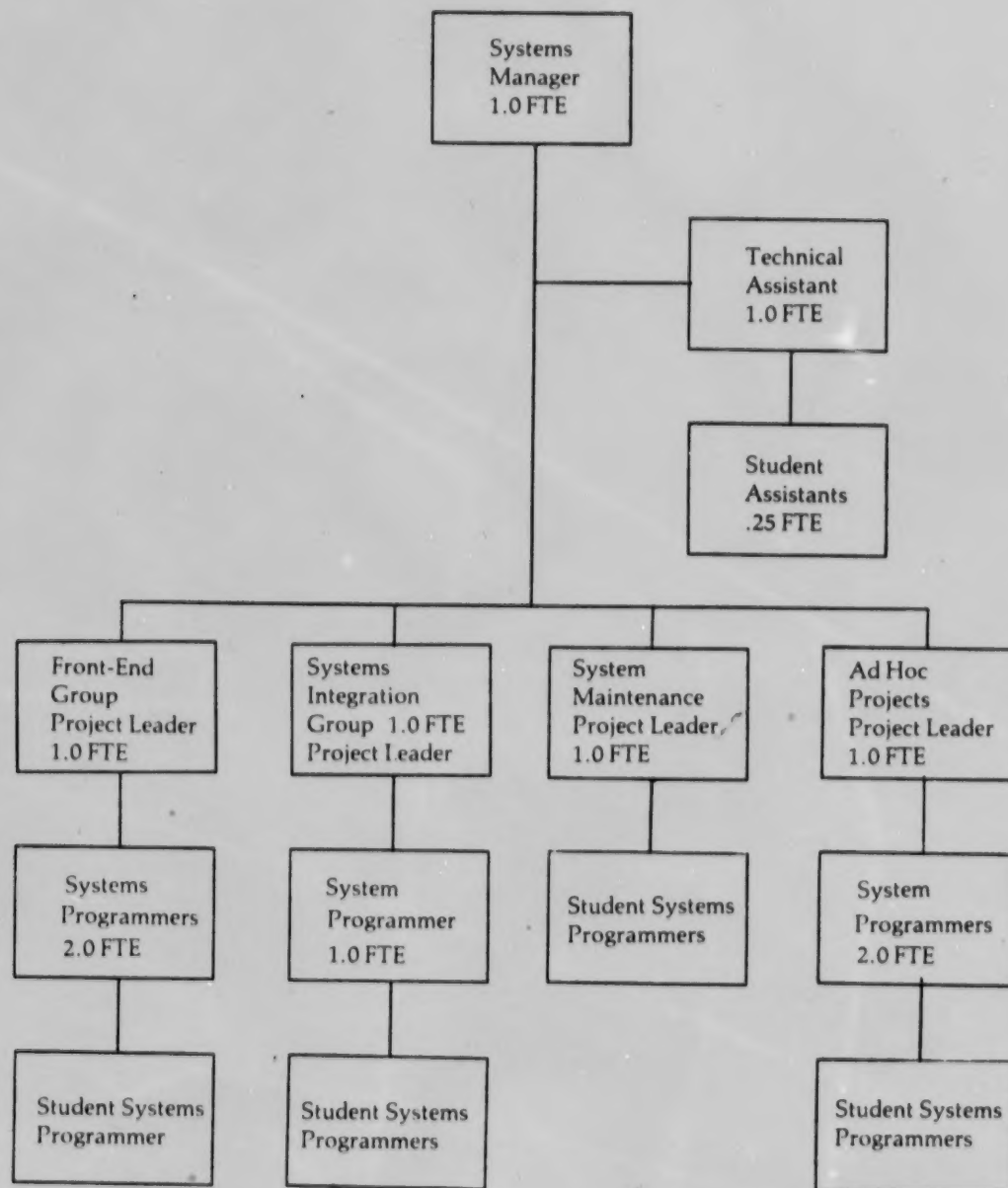


Figure 10
Systems Organizational Chart as of June 30, 1977

During the year one project leader resigned and six students left. One student went from part-time to full-time. Five students began their training in June 1977; four students (one of which left) completed their training in July 1976.

The students will work about 2 months full-time and 10 months part-time. This is .58 FTE for the year. On this basis the Systems Group had the following FTE positions:

AP13 or Specialist:	5.58 FTE
AP11	4.00 FTE
Student Systems Programmers ¹ :	5.94 FTE
Clerk Technical	1.00 FTE
	16.52 FTE

4.2.2

The Year in Review

System Maintenance

Last year the number of outstanding problems with various parts of the system (as measured by outstanding Systems Trouble Internal Reports) increased by 115%. This year, after the installation of the SCOPE 3.4 dependent products, we turned our effort to reducing this backlog. First we re-examined all outstanding STIRs to ensure that the problem still existed and assigned meaningful priorities. Then we started to work on the outstanding high priority (priority 3 thru 5) problems. The result of this effort is clearly visible in the following two charts. The first shows a 7% reduction in all outstanding STIRs; the second shows a 28% reduction in the outstanding high priority STIRs.

System Interruptions

Analysis and fixing of software problems which caused unscheduled interruptions to production (system crashes) continued throughout the year. There were no major new problems to solve and the mean time between interruptions improved by more than 100% over 1975-1976. The improvement anticipated in the last annual report occurred. Even though 1975-1976 was a bad year, we still had a 19% improvement over the previous good year of 1974-1975.

The chart below illustrates this improvement:

¹(The student that became full-time in May 1977 is included in this figure.)

Number of Outstanding STIRs
Number of STIRs Received
Number of STIRs Solved

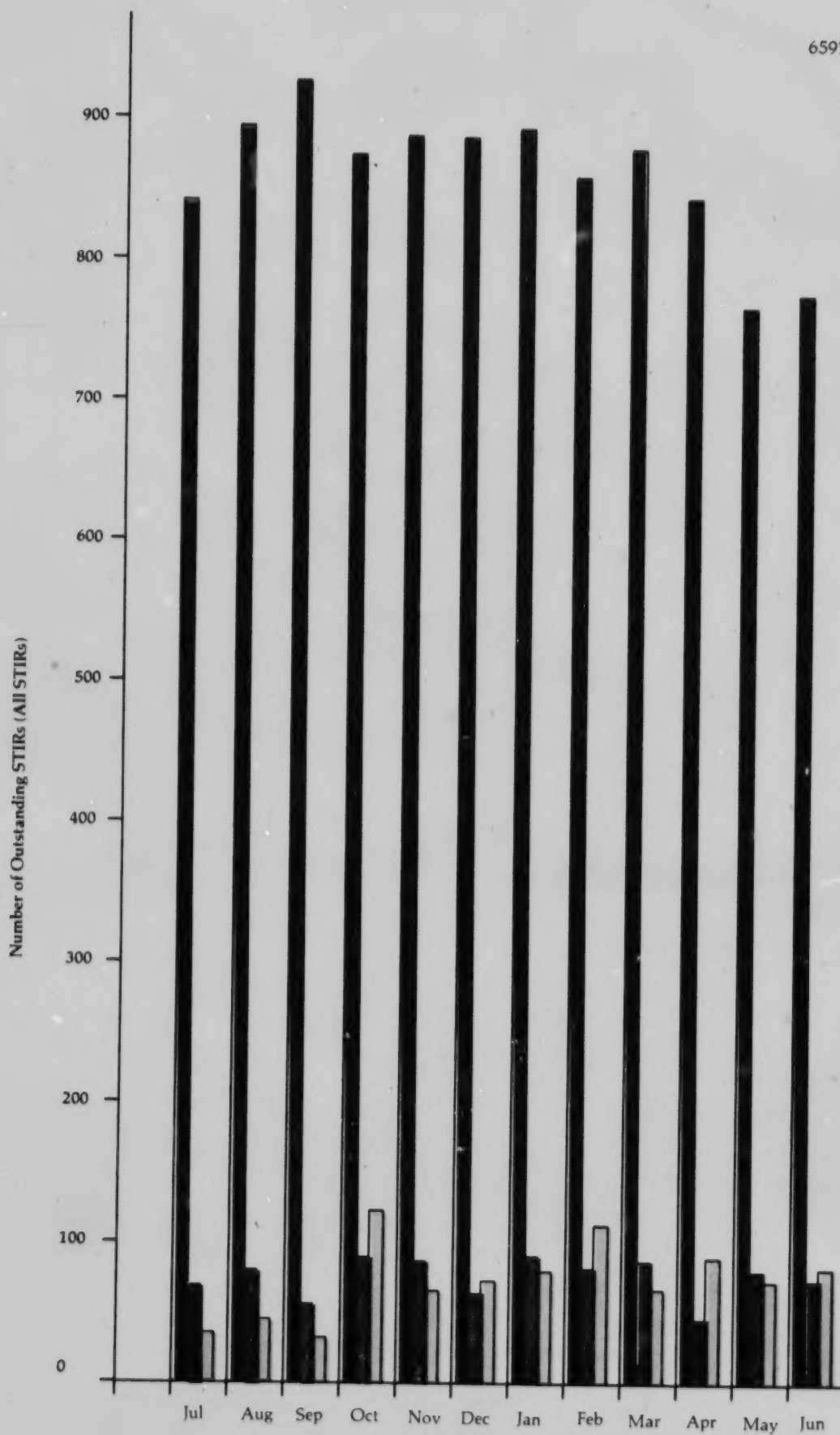


Figure 11
STIR Activity—All STIRs

Figure 12
STIR Activity—High Priority STIRs Only(P3—P5)

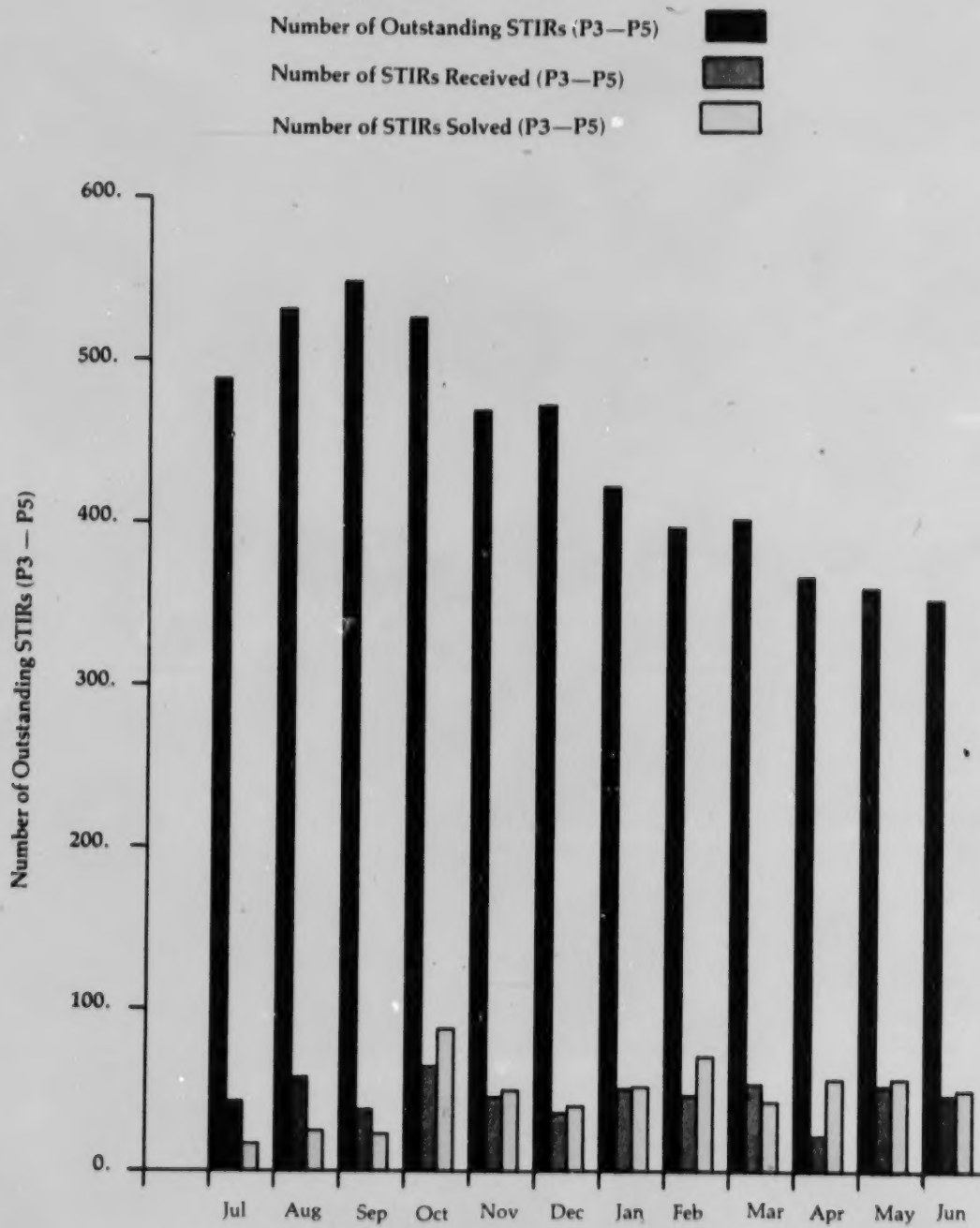


Table 10
Unscheduled Interruptions

	Number of Unscheduled Interrupts Caused By Software	Mean Time Between Interrupts (hours)
July 1976-June 1977	112	52.2
July 1975-June 1976	232	25.0
July 1974-June 1975	134	42.1

System Development Projects

Front-End System

Work continued throughout the year on the system to service the interactive terminals with the Interdata 7/32 Computer. This effort had two parts: continued support of the interim front-end system (known as GREASY) and development of the final solution (as yet unnamed but temporarily called MINIC).

GREASY was started last year to provide 1200 baud service; it was also expected to tell us how the hardware worked in the 7/32. The many problems discovered in GREASY, such as not answering phone lines and phone lines that will not transmit data after they are connected, encourage the belief that the design and implementation of MINIC will avoid similar problems. Also, an automatic baud rate determination was added to GREASY. This gave us effectively more 300 baud lines, showed us how such a facility should work in MINIC, and helped us plan the conversion to MINIC.

With the work on GREASY and other projects, the design effort for MINIC went slowly for the first two-thirds of the year. Systems Modification Proposal 28, detailing the goals for MINIC and subsequent efforts, was published; several development tools such as Front-End COMPASS, relocatable front-end loading, interface testing, front-end dumping, etc. were completed.

In the last third of the year the progress on MINIC picked up. Systems Modification Proposal 41 was published; this outlined the initial implementation goals of this project. By the end of April the detailed design of the 6500 and 7/32 sides was completed. We published the implementation schedule in May and completed a comprehensive set of 7/32 diagnostics for the memory, CPU, and interface. Also, we started coding the 7/32 monitor and the 6500 communication.

Disk Projects

The Central Processor Stack Processor (CPSP) was installed in March, 1977. Stimulator and artificial benchmarks showed a 10-15% throughput improvement. Equally important, reliability of the operating system improved after this installation.

Data are kept in central memory detailing the assignment of disk space (the Record Block Reservation table). With the double density 844 disks, this space is 320 words per disk unit. This seemed to be too much valuable memory to waste on this table; also, in a multiple machine environment all machines will need to access this table. Consequently, the Record Block Reservation tables were moved to ECS residence in June 1977.

Two double density 844 disk drives were available to us in January 1977. It was decided to temporarily use these as single density drives until the other disk projects were finished.

By the end of December all permanent file dumps were being automatically verified. This will help ensure that no file is written incorrectly when dumped onto a tape.

Benchmarking, Instrumentation, and Simulation

Two studies of the CDC Cyber 170 line (CYBER 174 and 175) were made. To make these studies an artificial job stream was created based on analysis of instrumentation data. The first study was done in August and the results were somewhat disappointing. An initial report was given to the Ad Hoc Facilities Committee. CDC ran some additional tests with much more encouraging results. In December we ran the job stream again at CDC's benchmark laboratory and obtained much more encouraging results. The report of these results was given to the Facilities Committee and used for their report.

We also verified that our operating system could run on the CYBER 170 computers. This was accomplished, but did require several small modifications. All of these changes have been installed on the current system.

Also, this benchmarking verified that while the disk scheduling of the standard NOS CDC operating system was superior to HUSTLER, our system as a whole outperformed NOS or NOS/BE. The Central Processor Stack Processor (CPSP) work brought HUSTLER in line with NOS.

SCOPE 3.4 Dependent Product Set

By the end of September, COBOL and SORT/MERGE were converted to the SCOPE 3.4 products. Cyber Record Manager, Data Description Language version 2, Data Base Utilities, Cyber Database Control System, 8-bit Subroutines, and FORM were added to our system. In October Query Update was installed and our effort to add the SCOPE 3.4 product set was completed.

Next Year's Plans

Before the beginning of fall term (October 1977), we expect to complete the user permanent file utilities (PFDUMP, PFLOAD, PFLIST) and the automatic execution of a file before a job begins.

Other projects can not be determined at this time since we do not know if a Cyber 170 system will be obtained. If it is, we will be doing work to utilize the full capability of this new hardware. If it is not the entire effort of the group will have to be reevaluated.

The distribution of the group's effort during the year is shown in Table 11. The FTE column gives the effort expended in terms of full-time equivalent employees. One person working full-time for the entire year would have 1.00 in the FTE column; 1.00 could also mean two people full-time for half the year. The "% of Group" column gives the percentage of the entire group that this FTE represents.

Table 11
Systems Programming Project Summary

Project	FTE	% of Group
STIR fixing, reporting, etc.	2.09	12.7
MINIC Front-End	1.93	11.7
Miscellaneous	1.03	6.2
Systems support (entering code, listings, etc.)	.85	5.1
Supervising and Administration	.78	4.7
System Generation	.73	4.4
Tape Maintenance	.72	4.4
Training new students (receiving & giving)	.71	4.3
Crash Analysis	.68	4.1
GREASY Front-End	.63	3.8
Code Review	.60	3.6
Vacation and Holidays	.59	3.6
Central Processor Stack Processor	.52	3.1
APL Maintenance	.50	3.0
EDITOR Maintenance	.42	2.5
System's documentation (SMP's, 6SM's, etc.)	.41	2.5
Instrumentation, Benchmarks, Stimulator	.39	2.4
PSR installation	.37	2.2
Permanent File and Disk miscellaneous projects	.32	1.9
SCOPE 3.4 dependent products	.26	1.5
MERIT	.26	1.5
CPU monitor improvements	.24	1.5
Operations projects	.24	1.5
ECS RBR's	.23	1.4
Monthly and Annual Reports	.19	1.2
Sick	.17	1.0
Miscellaneous projects	.16	1.0
Meetings	.14	.8
Hardware problems (helping to solve)	.14	.8
Permanent file and disk maintenance	.10	.6
VIM	.10	.6
Last Ditch Recovery	.05	.3
Exchange Jump Register Save/Load	.02	.1
Auto execution of a file at job start up	.02	.1
Reviewing user documentation	.02	.1

4.3

User Information Center

The User Information Center is responsible for providing documentation for Computer Laboratory supported services; consulting assistance to students, faculty and staff; maintenance of a collection of supported applications software for the university community; and provision of short courses on computer-related topics.

In addition to these general functions the User Information Center maintains a reference library containing all needed reference manuals and documents for all supported Computer Laboratory services, various computer periodicals and Computer Center publications; rents locker space, and publishes a newsletter, titled ACRONYMS, twice each term.

4.3.1

Organization

Functionally the User Information Center organization chart can be divided into two segments. The first, consisting of the technical writers and the entire clerical staff provides the majority of the documentation effort in the group. The remaining segment provides primarily consulting and programming support and assistance in the initial drafts of technical documents. Both segments contribute to short course activities.

Every administrative/professional staff member in the User Information Center is expected to be versatile in that they must:

1. have a broad technical computer background,
2. be able to effectively communicate with users who have little or no previous computer experience,
3. be able to teach effectively in the classroom situation,
4. be able to write accurately and intelligibly about the computer system and its intricacies.

In addition, the programming staff is expected:

1. to produce well documented, structured code,
2. to be able to effectively diagnose and suggest remedies for user programming problems.

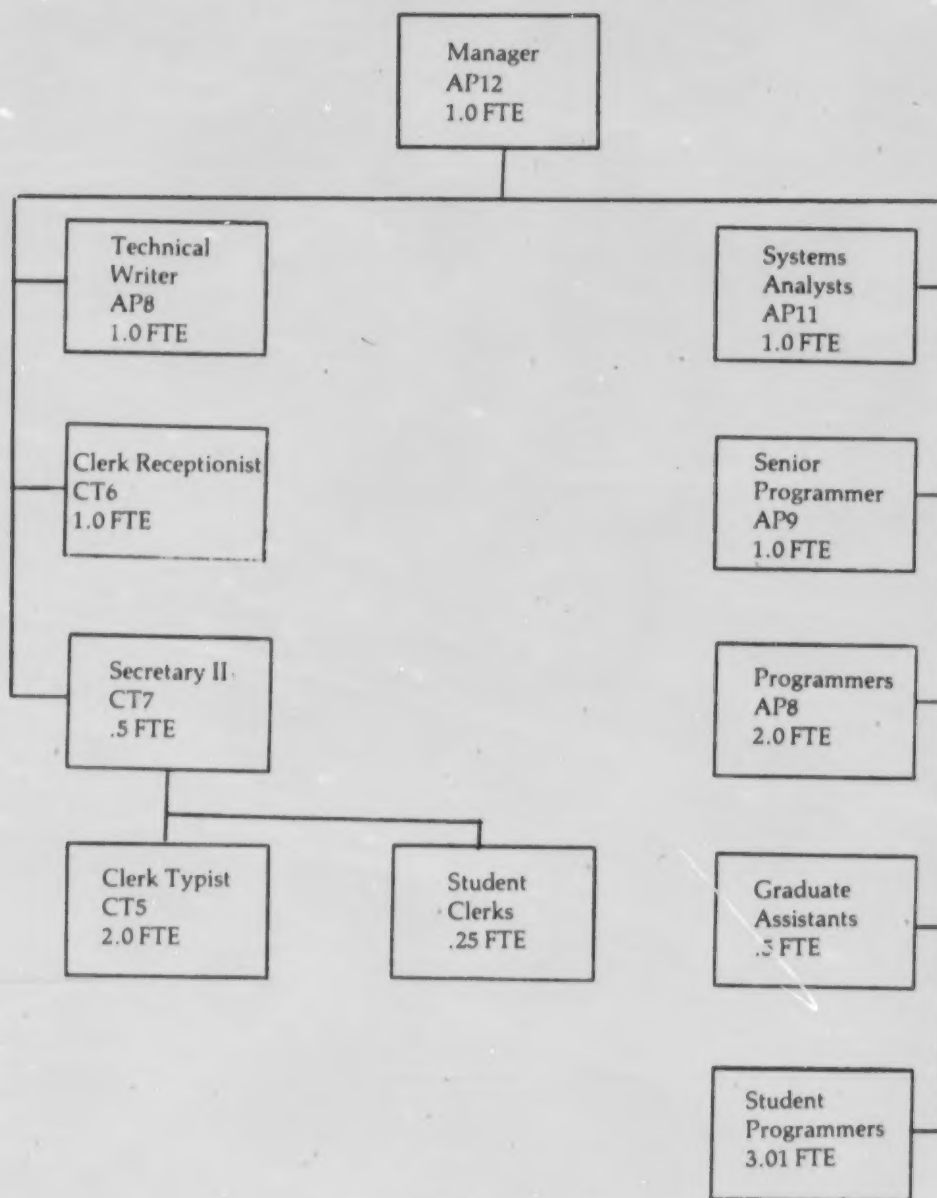


Figure 13
U.I.C. Organizational Chart as of June 30, 1977

4.3.2

The Year in Review

Consulting

Three types of consulting services are supplied to users in the User Information Center: general, SPSS/STAT and statistical. General consulting assists users in the use of the operating system and all dependent products other than SPSS (Statistical Package for the Social Sciences) and the MSU

STAT system. Consulting for the latter two packages is handled separately by consulting specialists within U.I.C. Through the Department of Statistics, graduate assistants are generally not knowledgeable in the use of the SPSS or MSU STAT system.

All consulting functions are limited to users of the Computer Laboratory with a current problem number who are not seeking assistance on an academic class problem.

In 1976-77, approximately 12,800 consultations were given.

Programming

Two major programming projects consumed much of the staff's programming effort. These were the AUTHORF project, to provide a new authorization file utility for users; and the REDACT project, to provide the User Information Center with word processing facilities for the production of user documentation. Other software activities included the installation of SPSS (Statistical Package for the Social Sciences) Version 6.5 and IMSL (International Mathematical and Statistical Library) Edition 4. A relatively small amount of work also went into a new version of HAL (the support system for the HUSTLER Auxiliary Library) to make it compatible with Cyber Loader libraries.

Documentation

Significant progress was made in the updating of user's guides, however, most of the work will not be visible to users for another 6 to 9 months when the major updating is scheduled to reach completion.

Eight issues of the newsletter, ACRONYMS, were published with 1200 copies of each issue being distributed.

Tours

The UIC staff continues to involve itself in the presentation of tours to student, faculty, staff and off-campus groups. A total of about 50 tours were given during the year.

Shortcourses

In this past year, 42 shortcourse sections were taught by the U.I.C. with a total enrollment of 1190. Fall and Spring terms continued to be the most popular terms for these offerings. See Table 12 for the data on shortcourse enrollment.

Miscellaneous Services

The User Information Center has kept statistics on other services it has provided in the past year. The usage of the HAL library routines supported is summarized in Appendix H. Appendix F lists all publications received by UIC during the year. In other miscellaneous services: 151 suggestions were processed; 885 System Trouble Internal Reports (S.T.I.R.) were generated; 22 new software exchange agreements were completed (see Appendix E). Appendix G summarizes the volume of manual sales and locker rentals.

Table 12
Short Course Enrollment

		Summer	Fall	Winter	Spring	Total
		1976	1976	1977	1977	
CL 100	Introduction to Computing	45	43	49	75	212
CL 101	Introduction to the MSU 6500	28	49	31	15	123
CL 115	GRADER		5		1	6
CL 125	Word Processing on MSU 6500		12			12
CL 140	The Authorization File and AUTHORF		9		4	13
CL 155	Basic SPSS	68	104	65	92	329
CL 175	Introduction to Interactive Usage		37	43	55	135
CL 210	APL				22	22
CL 220	BASIC		24		12	36
CL 240	Systematic Programming (PASCAL)		10			10
CL 255	Advanced SPSS		33	32	45	110
CL 260	Introductory Graphics				27	27
CL 275	Advanced EDITOR				17	17
CL 310	Introduction to Magnetic Tapes		26		17	43
CL 340	SORT/MERGE		12	15	9	36
CL 355	Advanced COBOL		4			4
CL 380	Introduction to Debugging		10		11	21
CL 410	Cyber Loader		8		5	13
CL 420	Record Manager		21			21
Total		141	407	235	407	1190

4.4

Applications Programming

Applications Programming is a self-supporting, non-profit section of the Computer Laboratory, providing assistance to users in utilizing the MSU computer facilities. Some of the services provided are: systems analysis and design of proposed projects, programming, job submission and pick-up, use of the statistical packages, use of census data, and address label production.

4.4.1

Organization

Although Applications Programming started and ended the year with a full-time equivalent (FTE) staff of four and one-half full-time people, over three months were spent in replacing two full-time people. In addition to the FTE staff of four and one-half people, Applications Programming employed two student programmers and three student assistants.

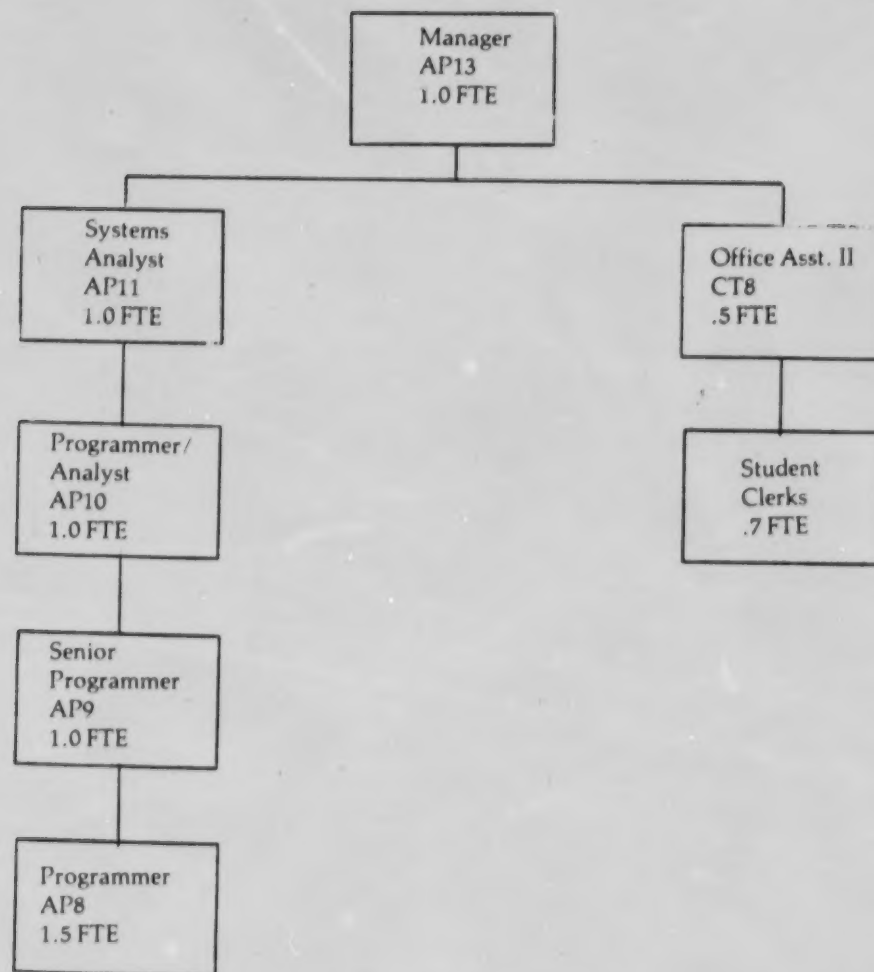


Figure 14
Applications Programming Organizational Chart as of June 30, 1977

4.4.2

The Year in Review

The total dollar value of services provided by the Applications Programming Group increased by 2.1% from \$87,271 to \$89,104. In addition, many thousands of dollars in computer charges were incurred by the clients of Applications Programming.

Table 13 gives the income summary for this fiscal year along with a percentage change from the previous year. Appendix I provides a summary by department of projects and project cost.

On-Campus

Service provided to on-campus clients included statistical analysis, label production runs, census

reports, and by the many custom systems and programs written and maintained for the various departments on campus. Some of the larger specialized systems are as follows: generating ascensions lists, field books, yield statistics and labels for generations of different crops for the Crop and Soil Science department; maintaining student records, grades and mailing lists for the Educational Institute's correspondence courses; a prisoner release study for the Department of Economics; maintaining radiation exposure data and providing exposure reports for the Radiation Safety Office; maintaining a data bank of questions and answers, and providing random test questions for Animal Husbandry.

State Government

Service to State Government clients this past year included developing and running a uniform crime statistics system for the State Police, developing a system to assist economic planners in preparation of the State budget for the Department of Management and Budget, providing many types of reports utilizing the census data bank, and in running a system to rate bridges for the Highway Department.

Non-Profit Organizations

Service to clients associated with non-profit agencies included utilizing the census data bank and providing Applications Programming expertise in the census data field. In particular, Applications Programming assisted the Western Michigan Shoreline Regional Development Commission in tabulating and report production of a mid-decade census of housing conducted within their region. Applications Programming also assisted the Michigan Recreation and Parks Association in the registration of all softball umpires and teams in Michigan.

Private Organizations

Service provided to clients from private organizations included report generation from the census bank and statistical analyses.

Other Services Provided

1. General

Many technical questions on COBOL, SORTMRG and special tape problems were answered by Applications Programming. With the installation of Record Manager, COBOL V4, SORTMRG V4 and conversion from SIS V1, Applications Programming was extremely busy in assisting users in conversion and understanding the new products. Applications Programming staff taught an advanced COBOL short course dealing with the differences between V3 and V4 and a SORTMRG short course. Also, many hours were spent in tracking down and documenting the installation bugs that were discovered in the new system.

2. Census Maintenance/Consulting

Much census maintenance was incurred in converting most census utility programs to COBOL V4, in addition to the many technical questions normally answered in the use and availability of census data.

Table 13
Applications Programming Income Summary

Income	76-77	% of Total	75-76	% of Total
On Campus	\$41,333.00	46	\$46,342.82	53
State Government	\$22,743.00	26	\$ 8,862.01	10
Non-profit Organizations	\$13,444.00	15	\$18,040.72	21
Private Organizations	\$ 4,019.00	5	\$ 2,184.00	3
Other Services Provided	\$ 7,566.00	8	\$11,608.00	13
Total & Services	\$89,104.00	100	\$87,271.05	100

4.5

Engineering Services

The Engineering Services group of the Computer Laboratory provides maintenance services for a wide variety of data communication and other computer related equipment. The section also provides electronic design, consultation, and fabrication services.

These services are available to the Computer Laboratory, all University departments, and to the entire computer user community. Service contract arrangements are available for many types of computer equipment.

4.5.1

Organization

The group is administered by the Engineering Supervisor. Repair work is assigned directly to an equipment technician. Design projects are assigned directly to a logic design engineer. Equipment construction may be assigned directly to an equipment technician or a student aid, or indirectly by a design engineer.

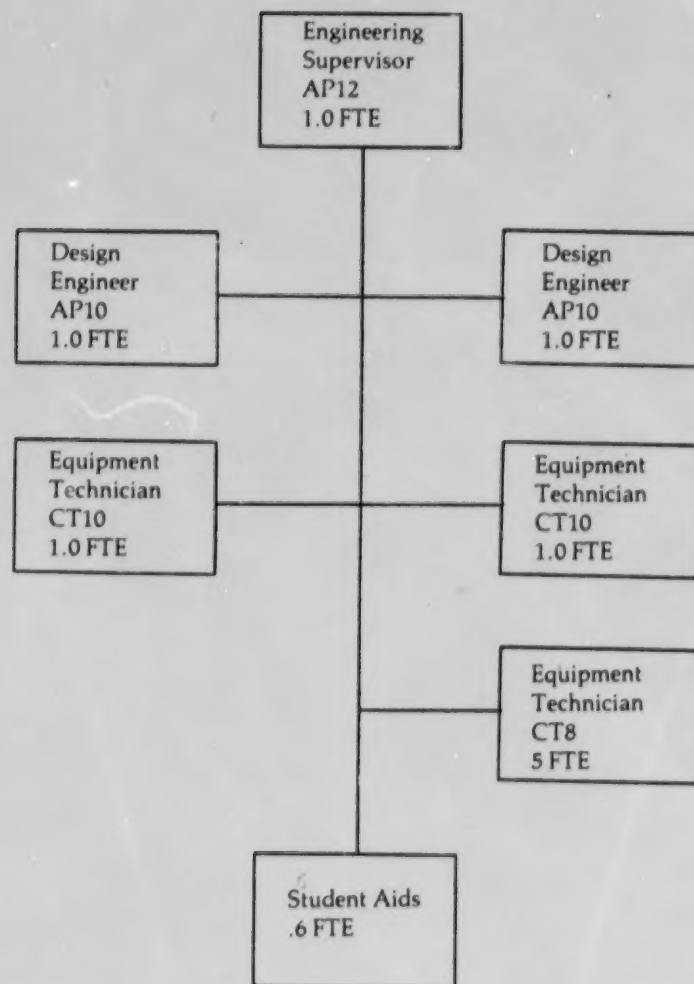


Figure 15
Engineering Services Organizational Chart as of June 30, 1977

4.5.2 The Year in Review

Engineering Services provided repair services for many types of computer terminals. These terminals included Teletype models 33 and 35, Texas Instrument 700 series, Teleray 3300 and 3900 series, DTC-300, and Decwriter model LA-36.

Additional maintenance responsibilities included the four remote batch terminals, data communication systems between the central site and the remote sites, the interactive data communication system, and some mini-computers on campus.

Computer terminal interface hardware was designed and built both for the Computer Laboratory and for customers outside the department. Various other electronic equipment was designed and built.

668 repair and construction jobs were completed in fiscal 76-77, in contrast with 503 in 75-76, a 33% increase. See Figure 16 for a graphic comparison of 1976-77 and 1975-76.

The dollar value of work performed outside the Computer Laboratory was \$24,995. The dollar value of maintenance services for the Computer Laboratory was \$14,306.

Table 14
Engineering Services Data

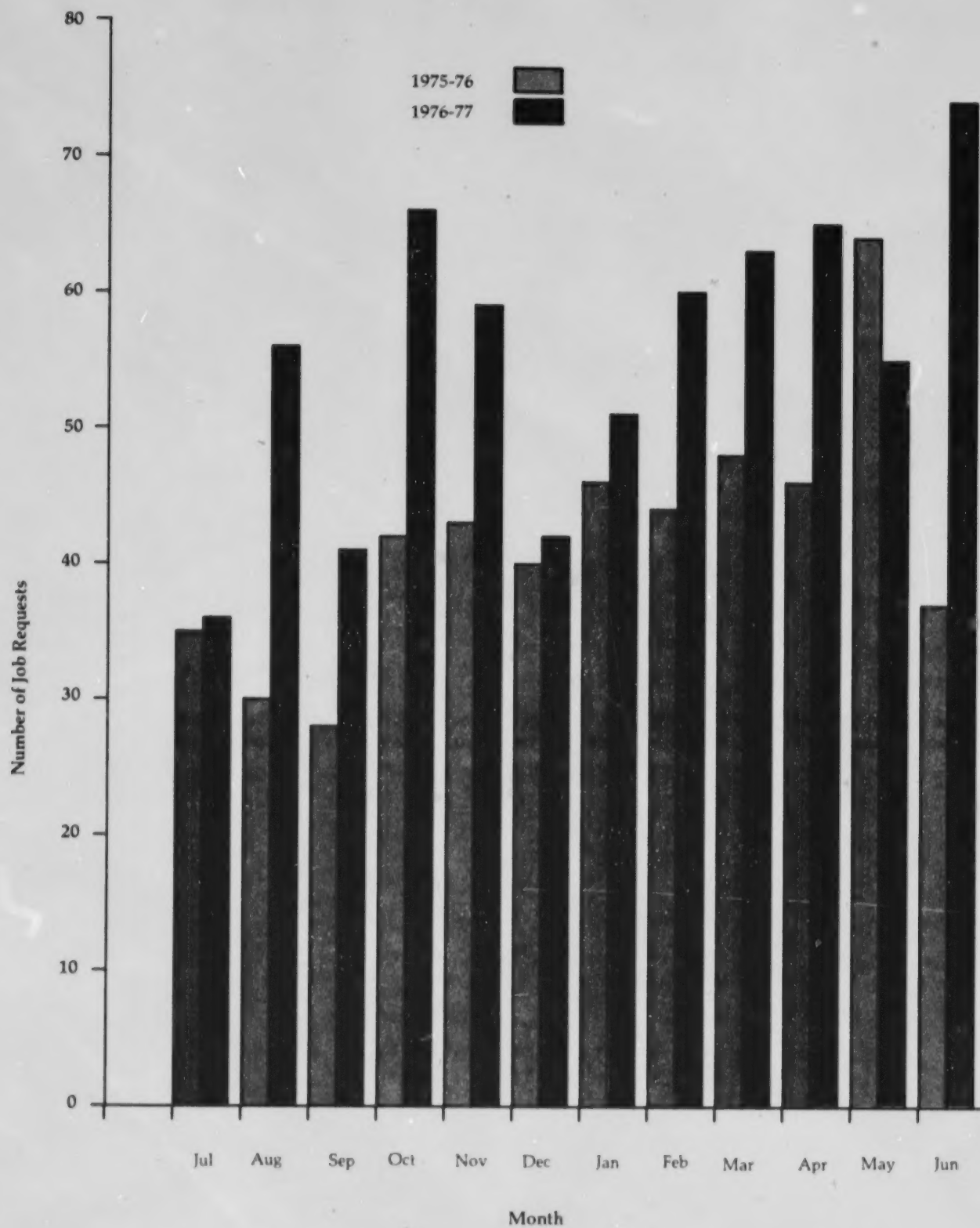
	76-77	75-76	% Change
No. of units on maintenance	264	214	+ 23 %
No. of repair jobs performed	668	503	+ 33 %
Dollar Value of Computer Lab Repair Work	\$14,306.00	\$16,571.00	-14 %
Dollar Value of External Work	\$24,995.00	\$18,981.00	+ 32 %

Proposed changes for 1977-78 include the following:

A data communications system to accommodate the new location of the HP-2000A mini-computer, will be designed and built. Other hardware changes relating to the HP-2000A will be performed.

A reorganization of the section staff is planned. This reorganization will create some new positions and will change the duties of others. These changes will accommodate the increased demand for services and provide a more efficient organization.

Figure 16
Engineering Services Job Requests



5.0

Merit Network

The Merit Computer Network connects the MSU 6500 to the IBM 360/67 and AMDAHL 470V/6 at Wayne State University and the AMDAHL 470V/6 at the University of Michigan. The Network allows all users possessing current access to the facilities at each university to use the combined resources of all three systems. Table 15 summarizes the use of the network for the four preceding years for comparison.

Table 15
Merit Network Usage

At Michigan State University					
Use By	76-77	75-76	74-75	73-74	72-73
University of Michigan	\$ 8,178	\$ 1,051	\$ 467	\$ 485	\$ 194
Wayne State University	\$14,380	\$13,716	\$ 447	\$ 734	\$ 1,892
At University of Michigan					
	76-77	75-76	74-75	73-74	72-73
Michigan State University	\$22,672	\$17,780	\$19,953	\$14,323	\$ 8,497
Wayne State University	\$60,744	\$21,031	\$15,087	\$11,104	\$17,535
At Wayne State University					
	76-77	75-76	74-75	73-74	72-73
Michigan State University	\$30,195	\$11,491	\$17,924	\$ 2,724	\$ 3,749
University of Michigan	\$ 1,277	\$ 2,173	\$ 4,584	\$22,612	\$ 3,562

Appendix A

**Computer Advisory Committee and
Subcommittees**

COMPUTER ADVISORY COMMITTEE CHARTER

FUNCTION:

To consider and make recommendations to both the Director of the Computer Laboratory and to the central administration of the University on all aspects of the computer efforts of the University as they affect education, research, and public service.

To this end, three subcommittees will also exist: the Operations Subcommittee, the Users' Subcommittee, and the Finances Subcommittee. Detailed information pertaining to the subcommittees follows.

MEMBERSHIP:

The members of the committee are appointed by the President of the University for an indefinite term. In the case of academic Colleges, recommendations are made to the President by the Dean of the College.

PROCEDURE:

The committee will elect its own chairperson and Secretary immediately subsequent to September 1, to hold office for one year. Meetings will be held as determined by the membership. Minutes of all meetings will be distributed to the membership.

COMPUTER ADVISORY COMMITTEE MEMBERSHIP

1976-1977

Cantlon, John E.
Cobb, T. Clinton
Dressel, Paul L.
Eick, Harry A. (Chairperson)
Fink, F.
Forsyth, John
Gonzalez, Richard F.
Grossman, Harold C.
Hardin, Einar
Hoefer, Jacob A.
King, Horace
Rosenberg, Ron
Schmidt, William
Sherbo, Arthur
Sprafka, Robert
Stimson, Roger C.
Tosi, Oscar I.
Von Tersch, L. W. (Ex-Officio)
Warrington, Willard
Wilkinson, Roger

Vice President for Research Development
College of Education
Office of Institutional Research
College of Natural Science
College of Engineering
Computer Science
College of Business
Lyman Briggs College
College of Social Science
College of Agriculture
Registrar
College of Engineering
College of Human Ecology
College of Arts and Letters
College of Human Medicine
Justin Morrill College
College of Communication Arts
Computer Laboratory
University College
Business & Finance

1977-1978

Cantlon, John E.	Vice President for Research Development
Cobb, T. Clinton	College of Education
Eick, Harry A. (Chairperson)	College of Natural Science
Fink, F.	College of Engineering
Freeman, Tom	Office of Institutional Research
Gonzalez, Richard F.	College of Business
Goodman, Erik	Electrical Engineering
Grossman, Harold C.	Lyman Briggs College
Hardin, Einar	College of Social Science
Hoefer, Jacob A.	College of Agriculture
King, Horace	Registrar
Rosenberg, Ron	College of Engineering
Sherbo, Arthur	College of Arts and Letters
Signell, Peter	College of Natural Science
Sprafka, Robert	College of Human Medicine
Stimson, Roger C.	Justin Morrill College
Tosi, Oscar I.	College of Communication Arts
Von Tersch, L. W. (Ex-Officio)	Computer Laboratory
Warrington, Willard	University College
Wilkinson, Roger	Business & Finance

Guests to CAC

Kateley, Julian	Computer Laboratory
King, Herman	Academic Services
Spyke, Donald	Computer Laboratory

USERS' SUBCOMMITTEE CHARTER

FUNCTION:

To consider and make recommendations both to the Director of the Computer Laboratory and to the Computer Advisory Committee on matters of computer use and application. This should include, but not be restricted to, the following items:

1. Arrangements governing maintenance of present statistical programs and acquisition of new statistical programs; funding and organization of consulting services in the statistical area.
2. Time-sharing uses of the computer; terminals and users units; computer-aided instruction, its languages and its techniques.
3. Coordination of computer training across the campus in computer applications and use.
4. Problems arising from the development of the Merit Computer Network and the use of the Merit Network; coordination of programming and computer use with other universities who are Merit members (presently University of Michigan and Wayne State University).

MEMBERSHIP:

Eight members to be selected for two-year terms by the Computer Advisory Committee, with terms of four members to expire on each August 31; one member to be recommended yearly by the Council of Graduate Students; the Director of the Computer Laboratory, or his/her designate. There are to be no restrictions on reappointment.

Membership shall be drawn from the University at large with a general knowledge of computer use and the problems of users as a primary requisite of membership.

The committee shall have the power to add non-voting members either for the discussion of specific issues or for the full term if its members consider that their work will be thereby enhanced.

PROCEDURE:

The subcommittee will elect its own Chairman and Secretary immediately subsequent to September 1 to hold office for one year. Meetings will be held as determined by the membership. Minutes of all meetings will be distributed to the membership and to the Computer Advisory Committee. The Computer Advisory Committee will make a formal request to the University Administration each year for the appointment of the Chairman of the Users' Subcommittee to the Computer Advisory Committee.

RESPONSIBLE TO:

Computer Advisory Committee and the Director of the Computer Laboratory.

USERS' SUBCOMMITTEE MEMBERSHIP

1976-1977

Bell, Norman¹
 Carroll, Tom (Ex-Officio)²
 Forsyth, John (Chairperson)
 Goodman, Erik
 Harrison, Jim
 Mao, Ivan
 St. Amand, Gerry (Secretary)
 Signell, Peter (Vice-Chairperson)
 Wittick, Robert³

Counseling and Personnel Service
 Computer Laboratory
 Computer Science
 Electrical Engineering & Systems Science
 Chemistry
 Dairy Science
 College of Business
 Physics
 Computer Institute for Social Science Research

¹Replaced on January 1, 1977 by:

Byers, Joe

Counseling and Personnel Service

²Added to Committee membership on January 1, 1977.

³Replaced on January 1, 1977 (for Winter Term only) by:

Dhanak, Harriet

Political Science

1977-1978

Byers, Joe
 Carroll, Tom (Ex-Officio)
 Goodman, Erik (Chairperson)
 Mao, Ivan
 Signell, Peter (Vice-Chairperson)
 Sprafka, Robert
 St. Amand, Gerry (Secretary)
 Watson, Layne
 Wittick, Robert

Counseling and Personnel Service
 Computer Laboratory
 Electrical Engineering & Systems Science
 Dairy Science
 Physics
 Office of Health Services Education & Research
 College of Business
 Mathematics Department
 Computer Institute for Social Science Research

OPERATIONS SUBCOMMITTEE CHARTER

FUNCTION:

To consider and to make recommendations both to the Director of the Computer Laboratory and to the Computer Advisory Committee on all matters pertaining to the efficient operation of the University Computer Center, including, but not restricted to, the flow of work through the computer, the priority arrangements, the controlling systems, the equipment and its availability to users, the staffing, the hours of operation, the services that are provided.

MEMBERSHIP:

Eight members to be selected for two-year terms by the Computer Advisory Committee, with the terms of four members to expire on each August 31; one member to be recommended yearly by the Council of Graduate Students; the Director of the Computer Laboratory, or his/her designate. There is to be no restriction of reappointment.

The eight members shall be chosen from the University at large and not be restricted to members of the Computer Advisory Committee. The prime qualifications shall be: (1) good knowledge of the technical operations of the Computer Laboratory, (2) interest in and responsiveness to criticisms about current operations and suggestions about improved ones. It is expected that the members of the Operations Subcommittee usually will be persons who are strongly familiar with computer technology and current operational matters.

PROCEDURE:

The subcommittee will elect its own Chairperson and Secretary immediately subsequent to September 1 to hold office for one year. Meetings will be held as determined by the membership. Minutes of all meetings will be distributed to the membership and to the Computer Advisory Committee.

RESPONSIBLE TO:

Computer Advisory Committee through the Director of the Computer Laboratory.

OPERATIONS SUBCOMMITTEE MEMBERSHIP

1976-1977

Fink, Fred (Chairperson)
 Greenberg, Lewis (Ex-Officio)
 Holland, John (Secretary)
 Ignatovich, Fred
 Keishnam, Raju*
 Myers, Wayne
 Price, Leighton
 Reid, Richard
 Tummala, R.
 Whitmore, James

Engineering Instructional Services
 Computer Laboratory
 Biochemistry
 Administration and Higher Education
 Chemical Engineering
 Forestry
 Computer Institute for Social Science Research
 Computer Science
 Entomology
 Physics

1977-1978

Fink, Fred (Chairperson)
 Greenberg, Lewis (Ex-Officio)
 Harrison, James
 Holland, John
 Myers, Wayne (Secretary)
 Price, Leighton
 Rahimi, Morteza
 Rasche, Robert
 Whitmore, James

Engineering Instructional Services
 Computer Laboratory
 Chemistry
 Biochemistry
 Forestry
 Computer Institute for Social Science Research
 Computer Science
 Economics
 Physics

FINANCES SUBCOMMITTEE CHARTER

FUNCTION:

To consider and make recommendations both to the Director of the Computer Laboratory and to the Computer Advisory Committee on all matters pertaining to the financial policies of the Computer Laboratory. These should include but not be restricted to the following items:

1. The identification of sources of funds which can be secured in support of academic computer needs.
2. Procedures to insure that the Computer Laboratory is adequately funded from year to year.
3. The encouragement of rational and optimal use of computer facilities.
4. Consideration of rate structures as they affect computer use from all segments of the University.
5. Maintenance of a reasonable degree of equity among the various units of the University.
6. Consideration of grant and contract pay procedures.
7. Consideration of possible wasteful redundancy of computing facilities.

*COGS Representative

MEMBERSHIP:

Four members to be selected for four-year terms by the Computer Advisory Committee, with the term of one member to expire on each August 31; the Director of the Computer Laboratory who will also serve as Chairperson There is to be no restriction on reappointment.

PROCEDURE:

Meetings will be held as determined by the Chairperson. Minutes of all meetings will be distributed to the membership and to the Computer Advisory Committee.

RESPONSIBILITY:

Computer Advisory Committee through the Director of the Computer Laboratory.

FINANCES SUBCOMMITTEE MEMBERSHIP

Andrew, Gwen	College of Social Science
Eick, Harry A.	College of Natural Science
Grider, Howard	Research Contracts
Hoefler, Jacob	College of Agriculture and Natural Resources
Von Tersch, L. W. (Ex-Officio)	Computer Laboratory

Appendix B

Service Summary

	CPU Hours		PP Hours		Core Word Hours		PF PRU Months		Number of Jobs	
	76-77	75-76	76-77	75-76	76-77	75-76	76-77	75-76	76-77	75-76
July	434	412	940	708	31,637,673	22,222,949	1,047,977	673,592	68,828	58,872
August	458	452	940	849	28,983,127	26,149,817	1,114,910	991,674	76,030	69,892
September	357	384	586	706	24,735,493	21,765,362	1,120,063	1,061,479	58,559	48,320
October	381	342	1,406	622	27,159,827	20,387,472	1,125,834	883,930	85,099	79,582
November	368	374	970	815	26,865,854	22,967,953	1,104,265	958,753	110,112	112,317
December	369	374	931	825	25,663,601	22,083,818	1,174,353	936,452	082,508	84,859
January	337	260	752	660	22,653,993	18,093,712	1,135,916	1,075,484	063,191	47,524
February	412	395	979	1,036	31,028,525	28,378,300	1,237,154	1,114,126	108,221	110,998
March	376	365	1,022	965	27,952,177	27,180,084	1,224,732	996,090	109,143	108,464
April	409	386	915	887	28,765,168	29,710,542	1,389,997	1,011,808	77,289	73,174
May	428	422	948	1,026	28,978,530	30,777,898	1,334,864	1,257,882	117,802	132,472
June	412	428	1,023	992	27,564,515	29,711,512	1,445,384	1,216,821	99,379	102,185
TOTAL	4,741	4,594	12,033	10,091	331,988,483	299,429,419	14,455,499	12,378,091	1,056,161	1,028,659

	Cards Read		Pages Printed		Cards Punched		Tapes Mounted		Paper Tape Frames	
	76-77	75-76	76-77	75-76	76-77	75-76	76-77	75-76	76-77	75-76
July	4,140,073	4,013,049	557,437	540,919	311,040	363,925	7,835	6,011	3,933,900	1,533,270
August	5,601,552	5,941,338	617,483	680,305	359,562	526,421	8,012	7,699	3,884,220	5,958,640
September	3,494,171	4,067,208	481,149	498,571	265,265	420,316	6,731	6,130	5,803,095	1,686,505
October	3,424,401	3,312,638	588,708	439,564	215,287	289,283	7,378	5,912	1,667,560	1,809,845
November	6,390,922	5,961,379	742,860	699,829	310,332	276,078	7,674	5,927	3,352,080	4,535,795
December	4,571,389	5,633,233	631,551	579,419	370,904	337,332	6,966	5,967	2,960,890	5,001,640
January	2,806,378	3,106,663	469,383	388,276	190,578	230,509	6,637	4,943	1,057,835	1,035,445
February	5,337,022	6,828,632	805,108	773,258	288,484	345,323	9,224	7,287	5,558,700	8,975,530
March	6,436,145	6,383,255	782,776	719,298	354,960	358,074	8,599	6,760	0	4,278,885
April	3,519,268	4,525,002	593,561	596,597	241,245	376,706	8,790	7,590	5,659,340	6,486,735
May	6,352,945	8,639,962	815,990	1,082,285	310,662	426,565	8,496	7,646	3,514,215	8,136,135
June	5,660,524	6,587,535	738,342	933,065	408,401	351,890	7,981	7,105	2,993,940	0284,835
Total	57,734,790	64,999,894	7,824,348	7,931,386	3,626,720	4,302,422	94,323	78,977	40,385,775	49,723,260

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Appendix C

Analysis of Computer Usage

COLLEGE AND DEPARTMENTS WITHIN (+ CODES)	PERCENT OF 6500 COMPUTER SERVICE		6500 PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)		PERCENT OF MERIT COMPUTER SERVICE		MERIT PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)	
	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76
AGRICULTURE								
AG - DEAN OF AGRICULTURE	.10	.03	.18	.05	---	---	---	---
AN - AGRICULTURE, NATURAL RESOURCES EDUCATIONAL	.00	.01	.00	.01	---	---	---	---
AT - AGRICULTURAL TECHNOLOGY	.00	.00	.00	.01	---	---	---	---
PR - PARKS AND RECREATION	.03	.05	.05	.09	.02	---	.02	---
06 - AGRICULTURAL ENGINEERING	1.22	1.44	2.14	2.57	5.09	1.94	5.09	1.94
09 - AGRICULTURAL ECONOMICS	3.57	4.08	6.24	7.29	.67	.26	.67	.26
16 - FISHERIES AND WILDLIFE	.11	.19	.19	.34	.00	1.54	.00	1.54
25 - HORTICULTURE	.23	.18	.40	.32	---	---	---	---
29 - DAIRY	1.57	.84	2.74	1.50	---	---	---	---
31 - FOREST PRODUCTS	---	---	---	---	---	---	---	---
35 - ANIMAL HUSBANDRY	.14	.17	.24	.30	---	---	---	---
37 - CROP SCIENCE	.23	.23	.40	.40	---	---	---	---
41 - FORESTRY	.20	.42	.35	.75	---	---	---	---
44 - SCHOOL OF PACKAGING	.01	.05	.02	.09	---	---	---	---
55 - RESOURCE DEVELOPMENT	.40	.08	.70	.14	---	---	---	---
58 - SOIL SCIENCE	.34	.39	.59	.70	.45	1.01	.45	1.01
59 - CO-OP EXTENSION SERVICES	.04	.01	.06	.02	---	---	---	---
61 - FOOD SCIENCE AND HUM. NUTRITION/AGRIC.	.01	.03	.02	.06	---	---	---	---
66 - AGRICULTURAL EXPERIMENT STATION	3.06	1.07	5.34	1.91	---	---	---	---
69 - POULTRY SCIENCE	.01	.02	.01	.03	---	---	---	---
76 - INSTITUTE FOR EXTENSION PERSL. DEVL.	---	---	---	---	---	---	---	---
83 - BIOCHEMISTRY	.46	.18	.80	.32	1.73	---	1.73	---
COLLEGE PERCENTAGE	11.72	9.46	20.48	16.88	7.97	4.75	7.97	4.75
ARTS AND LETTERS								
EL - ENGLISH LANGUAGE CENTER	---	---	---	---	.62	---	.62	---
GR - GERMAN AND RUSSIAN	.00	---	.00	---	---	---	---	---
RL - ROMANCE LANGUAGES	---	---	---	---	---	---	---	---
TH - THEATRE	.00	---	.00	---	---	---	---	---
43 - ARTS AND LETTERS COLLEGE OF	.05	.00	.08	.00	---	---	---	---
53 - LINGUISTICS	---	.00	---	.00	---	---	---	---
56 - ENGLISH	.01	.02	.01	.03	---	---	---	---
74 - MUSIC	.01	.01	.02	.02	---	---	---	---
80 - COMPARATIVE LITERATURE	---	---	---	---	---	---	---	---
94 - HISTORY	.00	.00	.01	.00	.18	.03	.18	.03
95 - PHILOSOPHY	---	---	---	---	---	---	---	---
COLLEGE PERCENTAGE	.07	.03	.12	.06	.80	.03	.80	.03
BUSINESS								
BL - BUSINESS LAW AND OFFICE ADMINISTRATION	---	---	---	---	---	---	---	---
DB - DEAN OF BUSINESS	.82	1.13	1.43	2.02	---	---	---	---
PU - PUBLIC UTILITIES INSTITUTE	.23	.54	.41	.96	---	---	---	---
13 - ECONOMICS	---	---	---	---	---	---	---	---
34 - BUSINESS AND ECONOMIC RES., BUR. OF	---	---	---	---	---	---	---	---
45 - MANAGEMENT	.29	.20	.51	.36	---	---	---	---
46 - ACCOUNTING AND FINANCIAL ADM.	.12	.16	.20	.28	---	---	---	---

COLLEGE AND DEPARTMENTS WITHIN (+ CODES)	PERCENT OF 6500 COMPUTER SERVICE		6500 PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)		PERCENT OF MERIT COMPUTER SERVICE		MERIT PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)	
	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76
BUSINESS(CONTINUED)								
49 - HOTEL, RESTAURANT, INSTIT. MGT	.09	.12	.16	.22	---	---	---	---
57 - MARKETING AND TRANSPORTATION ADMN.	.06	.13	.10	.23	---	---	---	---
COLLEGE PERCENTAGE	1.61	2.28	2.81	4.07	---	---	---	---
COMMUNICATIONS								
AU - AUDIOLOGY AND SPEECH SCIENCE	.01	.00	.02	.01	---	---	---	---
DC - DEAN OF COMMUNICATIONS	.00	---	.00	---	---	---	---	---
JO - JOURNALISM	.00	.02	.00	.04	---	---	---	---
08 - COMMUNICATION	.68	.66	1.18	1.17	---	.16	---	.16
62 - SPEECH	---	---	---	---	---	---	---	---
86 - INTERNATIONAL COMMUNICATIONS CENTER	---	---	---	---	---	---	---	---
89 - TELECOMMUNICATIONS	.05	.02	.08	.04	---	---	---	---
90 - ADVERTISING	.14	.08	.24	.14	.01	---	.01	---
COLLEGE PERCENTAGE	.88	.78	1.53	1.40	.01	.16	.01	.16
CONTINUING EDUCATION								
47 - HIGHWAY TRAFFIC SAFETY CENTER	.20	.06	.34	.10	.06	1.07	.06	1.07
81 - INSTITUTE FOR COMMUNITY DEVELOPMENT	.07	.09	.13	.16	---	---	---	---
97 - CONTINUING EDUCATION SERVICE	.15	.22	.26	.40	---	---	---	---
COLLEGE PERCENTAGE	.42	.37	.73	.66	.06	1.07	.06	1.07
EDUCATION								
AH - ADMISTRATION AND HIGHER EDUCATION	.17	.17	.29	.30	---	---	---	---
DE - DEAN OF EDUCATION	.38	.23	.67	.41	19.35	4.31	19.35	4.31
ES - ELEMENTARY AND SPECIAL EDUCATION	.03	.02	.06	.04	.06	---	.06	---
II - INSTITUTE FOR INTERNATIONAL STUDIES IN EDUC	---	---	---	---	---	---	---	---
SE - SECONDARY EDUCATION AND CURRICULUM	.04	.03	.07	.06	---	---	---	---
ST - OFFICE OF STUDENT TEACHING	.01	.01	.01	.01	---	---	---	---
VT - VOCATIONAL AND TECHNICAL EDUCATION	.00	---	.00	---	---	---	---	---
24 - EDUCATION: COUNSELING;PERSONNEL SERVICES;ED	.20	.26	.35	.46	24.49	10.92	24.49	10.92
65 - HEALTH, PHYSICAL EDUCATION AND REC.	.25	.02	.44	.03	.00	.02	.00	.02
92 - SCIENCE AND MATH TEACHING CENTER	.08	.07	.14	.13	---	---	---	---
99 - HUMAN LEARNING RESEARCH INSTITUTE	---	---	---	---	---	---	---	---
COLLEGE PERCENTAGE	1.16	.80	2.03	1.43	43.90	15.25	43.90	15.25
ENGINEERING								
SY - ENGINEERING SYSTEMS	---	---	---	---	---	---	---	---
03 - METALLURGY, MECH., MATERIAL SCIENCE	.12	.08	.21	.14	---	---	---	---
04 - ELECTRICAL ENGINEERING	1.49	1.51	2.61	2.70	.27	---	.27	---
05 - CIVIL ENGINEERING	.35	.27	.61	.48	.49	.00	.49	.00

COLLEGE AND DEPARTMENTS WITHIN (+ CODES)	PERCENT OF 6500 COMPUTER SERVICE		6500 PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)		PERCENT OF MERIT COMPUTER SERVICE		MERIT PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)	
	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76
ENGINEERING(CONTINUED)								
20 - CHEMICAL ENGINEERING	.06	.05	.15	.09	---	---	---	---
30 - COMPUTER SCIENCES	4.08	5.62	7.14	10.02	1.27	---	1.27	---
33 - MECHANICAL ENGINEERING	.65	.56	1.14	1.00	---	---	---	---
52 - ENGINEERING RESEARCH, DIVISION OF	.50	.55	.87	.97	---	---	---	---
68 - ENGINEERING INSTRUCTIONAL SERVICES	.03	.00	.05	.00	---	---	---	---
78 - DEAN OF ENGINEERING	.25	.26	.43	.47	---	.01	---	.01
COLLEGE PERCENTAGE	7.55	8.90	13.20	15.88	2.03	.01	2.03	.01
HUMAN ECOLOGY								
FC - INSTITUTE FOR FAMILY AND CHILD STUDY	.02	.06	.04	.10	---	---	---	---
FE - FAMILY ECOLOGY	.10	.11	.17	.19	.15	.30	.15	.30
39 - HOTEL,RESTAURANT,INSTITUTIONAL MNGEMNT	---	---	---	---	---	---	---	---
64 - HUMAN ENVIRONMENT AND DESIGN	.00	.01	.00	.01	---	---	---	---
71 - FAMILY AND CHILD SCIENCES	.01	.01	.02	.01	---	---	---	---
82 - FOOD SCIENCE AND HUM. NUTRITION/HUM. ECOL.	.02	.04	.03	.08	---	---	---	---
93 - HUMAN ECOLOGY	.01	.01	.03	.02	---	.05	---	.05
COLLEGE PERCENTAGE	.16	.23	.29	.41	.15	.36	.15	.36
HUMAN MEDICINE								
HD - HUMAN DEVELOPMENT	.07	.02	.12	.03	.85	---	.85	---
HM - HUMAN MEDICINE	.28	.16	.49	.29	7.25	4.59	7.25	4.59
MR - MEDICAL EDUCATION, RESEARCH, AND DEVELOPMEN	---	---	---	---	---	---	---	---
OH - OFFICE OF HEALTH SERVICES + ED. RESEARCH	1.44	1.74	2.52	3.11	16.39	38.67	16.39	38.67
OP - OMERAD - COLLEGE OF HUMAN MEDICINE	.14	.16	.25	.29	9.87	16.92	9.87	16.92
PH - PHARMACOLOGY	.06	.15	.10	.26	---	---	---	---
PY - PSYCHIATRY	.01	.01	.02	.02	---	---	---	---
SM - SOCIOLOGY, COLLEGE OF HUMAN MEDICINE	---	.00	---	.00	---	---	---	---
40 - PHYSIOLOGY	.10	.08	.17	.14	.01	---	.01	---
77 - ANATOMY	.06	.05	.11	.09	---	---	---	---
98 - PATHOLOGY	.06	.14	.10	.24	---	---	---	---
COLLEGE PERCENTAGE	2.21	2.51	3.87	4.48	34.37	60.18	34.37	60.18
JAMES MADISON								
JM - JAMES MADISON COLLEGE	.00	.00	.00	.00	---	---	---	---
COLLEGE PERCENTAGE	.00	.00	.00	.00	---	---	---	---
JUSTIN MORRILL								
32 - JUSTIN MORRILL COLLEGE	---	.00	---	.00	---	---	---	---
COLLEGE PERCENTAGE	---	.00	---	.00	---	---	---	---

COLLEGE AND DEPARTMENTS WITHIN (+ CODES)	PERCENT OF 6500 COMPUTER SERVICE		6500 PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)		PERCENT OF MERIT COMPUTER SERVICE		MERIT PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)	
	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76
LYMAN BRIGGS								
LB - LYMAN BRIGGS COLLEGE	1.32	1.43	2.30	2.56	---	---	---	---
COLLEGE PERCENTAGE	1.32	1.43	2.30	2.56	---	---	---	---
NATURAL SCIENCE								
BS - BIOLOGICAL SCIENCE	---	.01	---	.01	---	---	---	---
CY - CYCLOTRON LABORATORY	.01	.00	.01	.01	---	---	---	---
KB - KELLOGG BIOLOGICAL STATION	---	.00	---	.00	---	---	---	---
MB - MICROBIOLOGY AND PUBLIC HEALTH	.01	.00	.02	.00	---	---	---	---
NS - DEAN OF NATURAL SCIENCE	.15	.05	.27	.08	---	---	---	---
NU - NURSING	.02	.03	.04	.05	---	---	---	---
PL - AEC PLANT RESEARCH LABORATORY	.01	.01	.01	.02	---	---	---	---
10 - STATISTICS	.14	.06	.24	.11	---	---	---	---
14 - ENTOMOLOGY	2.51	2.19	4.38	3.91	.00	---	.00	---
15 - PHYSICS	10.05	10.17	17.57	18.15	---	.00	---	.00
19 - MATHEMATICS	.24	.28	.43	.49	.47	.70	.47	.70
21 - CHEMISTRY	4.10	2.73	7.16	4.87	.24	.92	.24	.92
42 - ZOOLOGY	.05	.04	.09	.07	---	---	---	---
48 - BOTANY AND PLANT PATHOLOGY	.09	.22	.16	.39	---	.00	---	.00
60 - GEOLOGY	.41	.39	.72	.69	.12	.02	.12	.02
73 - BIOPHYSICS	.02	.01	.03	.02	---	---	---	---
75 - ASTRONOMY	.11	.11	.19	.20	---	---	---	---
COLLEGE PERCENTAGE	17.92	16.30	31.33	29.08	.83	1.64	.83	1.64
OSTEOPATHIC MEDICINE								
CM - COMMUNITY MEDICINE	.03	---	.05	---	---	---	---	---
CO - COLLEGE OF OSTEOPATHIC MEDICINE	---	---	---	---	---	---	---	---
OM - OSTEOPATHIC MEDICINE	.66	.62	1.16	1.11	---	---	---	---
OO - OMERAD - COLLEGE OF OSTEOPATHIC MEDICINE	---	---	---	---	---	---	---	---
COLLEGE PERCENTAGE	.69	.62	1.21	1.11	---	---	---	---
SOCIAL SCIENCE								
SW - SOCIAL WORK, SCHOOL OF	.02	.02	.03	.04	---	---	---	---
02 - PSYCHOLOGY	.97	1.61	1.70	2.87	.07	---	.07	---
12 - URBAN PLANNING, LANDSCAPE ARCHITECTURE	.02	.01	.03	.01	---	---	---	---
17 - SOCIOLOGY	.11	.18	.19	.32	---	.00	---	.00
23 - ANTHROPOLOGY	.11	.02	.20	.03	---	---	---	---
28 - POLITICAL SCIENCE	.63	.83	1.09	1.48	2.46	1.36	2.46	1.36
38 - SOCIAL SCIENCE RESEARCH, BUREAU OF	---	.01	---	.01	---	---	---	---
51 - SCHOOL OF LABOR AND IND. RELATIONS	.24	.16	.42	.29	---	---	---	---
67 - GEOGRAPHY	.40	.39	.70	.70	---	---	---	---
79 - SCHOOL OF CRIMINAL JUSTICE	.46	.16	.81	.28	---	---	---	---
84 - COMPUTER INST. FOR SOC. SCI. RES.	.85	1.72	1.48	3.08	.00	.02	.00	.02
96 - COLLEGE OF SOCIAL SCIENCE	.03	.07	.04	.13	---	---	---	---
COLLEGE PERCENTAGE	3.84	5.18	6.71	9.24	2.53	1.38	2.53	1.38

COLLEGE AND DEPARTMENTS WITHIN (+ CODES)	PERCENT OF 6500 COMPUTER SERVICE		6500 PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)		PERCENT OF MERIT COMPUTER SERVICE		MERIT PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)	
	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76
UNIVERSITY COLLEGE								
HU - HUMANITIES	---	---	---	---	---	---	---	---
18 - NATURAL SCIENCE	.34	.10	.60	.19	.06	---	.06	---
63 - UNIVERSITY COLLEGE	.10	.07	.18	.12	---	---	---	---
70 - SOCIAL SCIENCE	.01	.00	.02	.00	---	---	---	---
COLLEGE PERCENTAGE	.46	.17	.80	.31	.06	---	.06	---
URBAN DEVELOPMENT								
UA - CENTER FOR URBAN AFFAIRS	.01	.32	.02	.56	---	---	---	---
US - URBAN AND METRO STUDIES	.20	.12	.35	.21	---	---	---	---
COLLEGE PERCENTAGE	.21	.44	.37	.78	---	---	---	---
VETERINARY MEDICINE								
AS - SMALL ANIMAL SURGERY AND MEDICINE	---	---	---	---	---	---	---	---
LA - LARGE ANIMAL SURGERY AND MEDICINE	.00	.00	.00	.00	---	---	---	---
91 - DEAN OF VETERINARY MEDICINE	.08	.00	.14	.01	---	---	---	---
COLLEGE PERCENTAGE	.08	.01	.14	.01	---	---	---	---
V.P.-STUDENT AFFAIRS								
SA - VICE PRESIDENT FOR STUDENT AFFAIRS	.01	.03	.02	.06	---	---	---	---
07 - COUNSELING CENTER	.01	.00	.02	.00	---	---	---	---
36 - DEAN OF STUDENTS	.00	.00	.00	.00	---	---	---	---
COLLEGE PERCENTAGE	.02	.04	.04	.06	---	---	---	---
MISCELLANEOUS								
AD - ADMISSIONS AND SCHOLARSHIPS	---	---	---	---	---	---	---	---
AP - APPLICATIONS PROGRAMMING	.03	.10	.05	.18	---	---	---	---
CE - CENTER FOR ENVIRONMENTAL QUALITY	---	.06	---	.10	---	---	---	---
DF - DEVELOPMENT FUND	.01	---	.02	---	---	---	---	---
EO - EQUAL OPPORTUNITIES PROGRAM	---	---	---	---	---	---	---	---
EV - EXECUTIVE VICE-PRESIDENT	---	---	---	---	---	---	---	---
GS - GRADUATE SCHOOL	.00	---	.00	---	---	---	---	---
HC - HONORS COLLEGE	.00	.00	.00	.00	---	---	---	---
IA - INTERCOLLEGIATE ATHLETICS	---	---	---	---	---	---	---	---
IM - INSTRUCTIONAL DEVELOPMENT AND TELECOMMUNICA	---	.01	---	.02	---	---	---	---
IP - INTERNATIONAL PROGRAMS	.00	---	.00	---	---	---	---	---
IS - INFORMATION SERVICES	.01	.02	.02	.03	---	---	---	---
IW - INST. FOR WATER RESEARCH	.01	---	.02	---	---	---	---	---
KC - KELLOGG CENTER	.01	.00	.02	.00	---	---	---	---
PP - PHYSICAL PLANT	.39	.43	.67	.77	---	---	---	---
PS - PUBLIC SAFETY	.00	.00	.00	.00	---	---	---	---

COLLEGE AND DEPARTMENTS WITHIN (+ CODES)	PERCENT OF 6500 COMPUTER SERVICE		6500 PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)		PERCENT OF MERIT COMPUTER SERVICE		MERIT PERCENT EXCLUDING COMP.LAB.(DEPTS 01,27)	
	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76	1976-77	1975-76
MISCELLANEOUS(CONTINUED)								
RD - RESEARCH DEVELOPMENT	.04	.35	.07	.62	---	---	---	---
SP - SPECIAL PROGRAMS	.01	.01	.02	.02	---	---	---	---
TV - TV BROADCASTING	---	---	---	---	---	---	---	---
UM - UNIVERSITY OF MICHIGAN	.17	.03	.30	.05	---	---	---	---
UR - UNIVERSITY RELATIONS	---	.00	---	.00	---	---	---	---
WC - WASTE CONTROL AUTHORITY	---	---	---	---	---	---	---	---
WS - WAYNE STATE UNIVERSITY	.31	.35	.54	.62	---	---	---	---
01 - COMPUTER LABORATORY	30.20	31.65	---	---	---	---	---	---
11 - LEARNING AND EVALUATION SERVICES	.06	.13	.11	.23	---	1.04	---	1.04
22 - OFF-CAMPUS	2.54	2.14	4.44	3.82	2.09	2.38	2.09	2.38
26 - PROVOST OFFICE	.01	.22	.02	.39	---	---	---	---
27 - OPERATIONS OVERHEAD	12.60	12.31	---	---	---	---	---	---
50 - STATE OF MICHIGAN	2.82	2.36	4.93	4.22	---	---	---	---
54 - INSTITUTIONAL RESEARCH	.31	.09	.54	.15	5.19	11.74	5.19	11.74
72 - UNIVERSITY SERVICES	---	---	---	---	---	---	---	---
85 - LIBRARY	---	---	---	---	---	---	---	---
87 - RESIDENCE HALLS	---	.00	---	.00	---	---	---	---
88 - REGISTRARS OFFICE	---	---	---	---	---	---	---	---
COLLEGE PERCENTAGE	49.53	50.26	11.77	11.24	7.28	15.16	7.28	15.16
ACADEMIC SERVICES								
AE - AEROSPACE STUDIES	---	---	---	---	---	---	---	---
CL - COMPUTER LAB. RESEARCH	.00	---	.00	---	---	---	---	---
IT - INSTRUCTIONAL AND PUBLIC TELEVISION	.00	---	.00	---	---	---	---	---
MU - MUSEUM	.00	.00	.00	.00	---	---	---	---
PA - PLANETARIUM	.00	.00	.00	.00	---	---	---	---
RS - RADIATION SAFETY	.13	.12	.23	.22	---	---	---	---
VM - LABORATORY ANIMAL CARE SERVICE	.02	.05	.04	.10	---	---	---	---
COLLEGE PERCENTAGE	.16	.18	.27	.32	---	---	---	---

**Computer Service
Dollar Usage by Source¹**

	Central Batch	Remote Batch	Interactive	Total Dollars
72-73	52%	31%	17%	\$ 1,133,200
73-74	53	23	24	1,416,450
74-75	60	17	23	1,871,133
75-76	60	13	27	2,281,133
76-77	59	12	28	2,891,654

**Computer Service
Number of Jobs by Source¹**

	Central Batch	Remote Batch	Interactive	Total
72-73	280,594	158,385	91,328	530,307
73-74	366,120	133,235	127,712	627,067
74-75	439,223	126,533	193,110	758,866
75-76	459,053	110,535	227,423	797,011
76-77	435,034	95,629	234,556	765,219

Interactive Service—Connect Time²

	Hours	Change
71-72	5,385	
72-73	18,821	249.51%
73-74	37,370	98.55%
74-75	62,981	234.63%
75-76	77,912	23.71%
76-77	90,532	16.20%

Connect Time Per Production Hour

	CT/PH	Change
71-72	3.60	
72-73	5.54	53.89%
73-74	8.60	55.23%
74-75	16.22	88.60%
75-76	18.53	14.23%
76-77	21.36	15.27%

¹Excludes permanent file charges and all Computer Laboratory use.

²Excludes all Computer Laboratory use.

Central Processor Utilization

	CPH/PH ^a	Change
71-72	24.5%	
72-73	25.8%	5.31%
73-74	34.0%	31.80%
74-75	43.5%	27.90%
75-76	39.9%	-8.28%
76-77	41.2%	3.26%

Permanent File Utilization¹

	Dollar Value	Change
71-72	\$138,107	
72-73	\$237,829	72.21%
73-74	\$299,588	25.97%
74-75	\$381,111	27.21%
75-76	\$549,612	44.21%
76-77	\$720,641	31.12%

Central Memory Utilization

	CWH/PH ²	Change
71-72	23,828	
72-73	23,231	-2.51%
73-74	31,798	36.88%
74-75	40,043	25.93%
75-76	51,958	29.76%
76-77	57,675	11.00%

¹ Excludes all Computer Laboratory use.

² Core word hours per production hour.

^a Central processor hours per production hour.

Appendix D

Financial Information

Michigan State University
Computer Laboratory
February 1977
Rates

Computer Services Rates¹

Central Processor	\$160/hour
Central Memory	\$.0042/word-hour
Peripheral Processor	\$10.00/hour
Card Read	\$1.00/1000 cards
Card Punch	\$4.00/1000 cards
Print	\$1.00/1000 lines
Paper Tape	\$0.07/1000 frames
Plotting	\$30.00/hour
Tape Unit Reservation Time	\$3.00/hour

Express and Reduced jobs are charged as follows:

Rate Group 3 (Express)	1.5 x above rates
Rate Group 1 (Reduced)	0.5 x above rates

Other Computer Services Rates and Computer Supplies Rates

Connect Time ²	\$1.50/hour
Disk Storage ²	\$0.08/pru-month
Tape Mount	\$.25/mount
Card Stock	\$2.17/1000 cards
Printer Paper	\$.007/page
Plotter Paper	\$0.01/inch
Telenet	\$4.80/hour

Other Supplies and Miscellaneous Services

Keypunch	\$7.50/hour
Verify	\$7.50/hour
Express Keypunching or Verifying	50% premium
Continuous Forms Copying/Reducing	Acct. No. - .045 cc.
	Other - .055 cc.
Tape Storage	\$6.95 each
2400' Magnetic Tape ³	\$16.50 each
Labels	By Quote Only

¹All billings for Computer Services to off-campus users (no MSU account number) will include a 10% surcharge.

²These computer services are charged only at Rate Group 2.

³Other tape lengths are available. Check at the Service Window - Rm. 208 C.C.

Michigan State University
6500 Amortization Summary

	1976-77	1975-76	1974-75	1973-74	1968-73
INCOME					
	2,700,353.77	2,210,246.42	1,916,463.22	1,773,547.02	3,838,968.49
EXPENDITURES					
AMORTIZATION	740,767.50	414,031.16	229,513.79	330,506.21	345,844.81
SALARIES	761,867.81	333,610.09	711,293.10	660,885.85	1,461,583.47
SALARIES BURDEN	142,448.71	128,993.38	115,624.30	72,737.53	211,967.56
OVERHEAD BURDEN	502,832.75	469,510.46	448,114.65	411,339.19	885,836.38
SUPPLIES AND SERVICES	552,437.00	464,101.33	411,917.38	298,078.24	933,736.27
TOTAL EXPENSES	2,700,353.77	2,210,246.42	1,916,463.22	1,773,547.02	3,838,968.49
UN-AMORTIZED 6500 (AS OF END OF FISCAL YEAR)	1,607,393.49	2,224,786.03	2,638,817.22	2,432,846.59	2,122,408.06

Appendix E

Software Exchange Agreements

Note: * indicates a new agreement signed this year.

Department of the Air Force, Headquarters Armament Development & Test Center (AFSC); Eglin Air Force Base, Florida 32542

Argonne National Laboratories, Argonne, Illinois 60439

The University of Arizona, Tucson, Arizona 85721

Department of the Army, United States Military Academy, West Point, New York 10996

Auburn University, Auburn, Alabama 36830

Institut für Anorganische und Analytische Chemie, Universität Innsbruck, Innsbruck, Austria

Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201

*Bendix Corporation (The), Kansas City Division, P.O. Box 1159, Kansas City, Missouri 64141

Bettis Atomic Power Laboratory

Boeing Computer Services, Inc., P.O. Box 24346, Seattle, Washington 98124

The Boeing Company, Commercial Airplane Division, P.O. Box 3707, Seattle, Washington 98124

Bonnerville Power Administration, U.S. Department of the Interior, Systems Programming Section-SWS, P.O. Box 3621, Portland, Oregon 97208

Brock University, Glenridge Campus, St. Catharines, Ontario, Canada

Brookhaven National Laboratory, Associated University, Inc., Upton, New York 11973

Brussels Free Universities, Computer Centre, Avenue F. D. Roosevelt 50, 1050 Bruxelles - Belgium

Cabot Corporation, Concord Road, Billerica, Massachusetts 01821

The University of Calgary, Calgary, Alberta, Canada T2N 1N4

University of California-Berkeley, Berkeley, California 94720

University of California-Lawrence Livermore Laboratory, Berkeley, California 92664

University of California-Irvine, Department of Chemistry, Irvine, California 92717

University of California-San Francisco, 1438 S. Tent Street, Richmond, California 94122

Carderock Lab., Department of the Navy, Bethesda, Maryland 20034

Chrysler Corporation, P.O. Box 1118, Detroit, Michigan 48231

University of Colorado Computer Center, 3645 Marine Street, Boulder, Colorado 80302

Colorado State University, Computer Center, Fort Collins, Colorado 80523

Computer Sciences Corporation, Atomic Energy Division, 825 Judwin Avenue, Richland, Washington 99352

Computer Sciences Corporation, Computer Systems Department, P.O. Box 15390, Las Vegas, Nevada 89114

University of Connecticut Health Center, Department of Biochemistry, University of Connecticut, Storrs, Connecticut 06268

Dalhousie University Computer Centre, Halifax, Nova Scotia, Canada

DAYCO Corporation, Research and Development Laboratories, Waynesville, North Carolina 28786

Defense and Space Systems Group of TRW Inc., TRW DSSG, One Space Park, Redondo Beach, California 90278

University of Delaware, Newark, Delaware 19711

Drake University, Des Moines, Iowa 50311

Ecole Polytechnique Federale-Lausanne Centre De Calcul, Ar. de Cour 33, CH1007 Lausanne, Switzerland

Erie County Laboratory, 462 Grider Street, Buffalo, New York 14215

Florida State University, Computing Center, Tallahassee, Florida 32306

Fluor Corporation, 2500 South Atlantic Boulevard, Los Angeles, California 90040

General Dynamics, Electro Dynamic Division, P.O. Box 2507, Pomona, California 91766

*General Dynamics, Data Systems Services, Western Data Systems Center, P.O. Box 80986, San Diego, California 92138

University of Georgia, Department of Chemistry, Athens, Georgia 30602

Freie Universitat Berlin, Zentralenrichtung fur Datenverarbeitung (ZEDAT), FU Berlin, Zedat Abt. 1, 1 Berlin 33, Arnimallee 3 (GERMANY)

Regionales Rechenzentrum f. Niedersachsen, Wunstorfer Str. 14/18, D3 Hannover, Germany

Rekenentrum der Rijksuniversiteit, Landleven 1, Postbus 800, Groningen (GERMANY)

Rechenzentrum, RWTH Aachen, 51 Aachen, Seiffenter Weg 23, Germany

Universidad Autonoma De Guadalajara, Institute of Exact and Terrestrial Sciences (ICET), Department De Quimica, APDO Postal no. 1-440, Guadalajara, Mexico.

Hofstra University, Hempstead, L.I., New York 11550

Illinois Institute of Technology, Department of Chemistry, 3255 S. Dearborn, Chicago, Illinois 60616

Indiana University, Bloomington, Indiana 47401

Universita Di Bologna, Via Zamboni 33, 40126 Bologna, Italy

Universita Degli Studi Di Milano, Istituto di Chimica Fisica, 20133 Milano, Via Saldini, 50, Italy

Imperial College Computer Center, Exhibition Road, South Kensington, ENGLAND SW7 2A2

Ithaca College, Ithaca, New York 14850

University of Kansas Medical Center, Rainbow Boulevard at 39th Street, Kansas City, Kansas 66103

*Kitt Peak National Observatory, P.O. Box 26732, Tucson, Arizona 85726

*Knolls Atomic Power Laboratory, General Electric Company, Box 8, Schenectady, New York 12301

Lehigh University, Computer Center, Bethlehem, Pennsylvania 18015

LTV Aerospace Corporation, Scientific Computers, 10101 Bren Rd., E., Minnetonka, Minnesota 55343

University of Manchester, Regional Computer Centre, Oxford Road, Manchester M13 9PL ENGLAND

McMaster University, Data Processing & Computing Centre, Hamilton, Ontario, Canada

McMaster University Health Sciences Centre, Department of Biochemistry, 1400 Main Street West, Hamilton, Ontario, Canada

*Michigan Consolidated Gas Company, One Woodward Avenue, Detroit, Michigan 48226

Mid-Illinois Computer Cooperative, Cottonwood Office Center I, Cottonwood Road, Edwardsville, Illinois 62025

*University of Minnesota, University Computer Center, 227 Experimental Engineering Building, Minneapolis, Minnesota 55455

Mobil Research & Development Corporation, Paulsboro, New Jersey 08066

University of Montana, Missoula, Montana 59801

National Computer Network of Chicago, Inc., 1929 North Harlem Avenue, Chicago, Illinois 60635

Naval Submarine Medical Research Laboratory, Naval Submarine Medical Center, Naval Submarine Base New London, Groton, Connecticut 06340

Department of the Navy, Carderock Lab, Bethesda, Maryland 20014

Fleet Numerical Weather Central, FNWC, Monterey, California 93940

Department of the Navy, Naval Ship Research Center, Bethesda, Maryland 20014

ACCU (Academisch Computer Centrum), Utrecht, Netherlands

Transitorium I Rijksuniversiteit, Utrecht, Netherlands

- State University College-New York, Department of Chemistry, New Paltz, New York 12561
- North East London Polytechnic, Romoord Road, London, England E15 4L2
- Northern Illinois University, The Michael Paraday Laboratories, Department of Chemistry, DeKalb, Illinois 60115
- Oakland University, Rochester, Michigan 48063
- Oregon State University, Corvallis, Oregon 97331
- Institute of Paper Chemistry, Appleton, Wisconsin 54911
- The Ralph M. Parsons Company, P. O. Box 4802, Los Angeles, California 90054
- Purdue University, Department of Chemistry, Lafayette, Indiana 47907
- Purdue University, Mathematical Sciences Bldg., West Lafayette, Indiana 47907
- RECAU: NYMunkegade, 8000 Aarhus C, Denmark
- Rockhurst College, 5225 Troost Avenue, Kansas City, Missouri 64110
- Royal Melbourne Institute of Technology, 124 Latrobe Street, Melbourne, Victoria 3000 - AUSTRALIA
- *Sandia Laboratories, Albuquerque, New Mexico
- University of Saskatchewan, Regina Campus, Regina, Canada S4S 0A2
- The South Australian Advanced Education Computer Network, P. O. Box 1, Ingle Farm, SA 509.8, AUSTRALIA
- University of South Carolina, Computer Services Division, Columbia, South Carolina 29208
- Southwestern Ohio Regional Computer Center
- Stanford University, Stanford, California 94305
- Stanford University Medical Center, Stanford, California 94305
- Tektronix, Inc., Scientific Computer Center, DS 50-454, Beaverton, Oregon 97077
- *FIDES, Treuhandgesellschaft, Rechenzentrum (WICA), Bleicherweg 33, 8002 Zurich, Switzerland
- Temple University, Philadelphia, Pennsylvania 19122
- University of Texas at Austin, Austin, Texas 78712
- Texas Tech University, Lubbock, Texas 79409
- Department of Chemistry, Tufts University, Medford, Massachusetts 02155
- UNS Computing Center, P. O. Box 9068, Reno, Nevada 89507

Virginia Institute for Scientific Research, 6300 River Road, Richmond, Virginia 23229

University of Virginia, Charlottesville, Virginia 22903

Vogelback Computing Center, Northwestern University, 2129 Sheridan Road, Evanston, Illinois 60201

University of Washington, Seattle, Washington 98105

Wrubel Computing Center, Indiana University, BPER Bldg., Gym Add. Room 76, Bloomington, Indiana 47401

U. S. Army Medical Bioengineering Research & Development Laboratory, USA Medical Bioengineering R & D Laboratory, Ft. Detrick, Frederick, Maryland 21701

Youngstown State University, 410 Wick Avenue, Youngstown, Ohio 44555

Appendix F

**Periodicals and Newsletters Received by
UIC**

PERIODICALS

The Bell System Technical Journal
 Computer Decisions
 The Computer Journal
 Computer Languages
 Computer World
 Creative Computing
 Datamation
 Diebold Research Program
 Information Systems
 Interface
 Law and Computer Technology
 Modern Office Procedures
 The Office
 NTIS Printed Reports
 Pipeline
 PLANIT Newsletter

Quantum Chemistry Program Exchange
 System
 U of M Memos
 VIM Newsletters
 ACM Transactions
 Mathematical Software
 Database Systems
 Communication of the ACM
 Computing Reviews
 Computing Surveys
 Journal of ACM
 ACM SIG Communications
 Argonne National Laboratory
 The Austrian Computer Journal
 Department of Commerce Technical Reports
 University of Illinois Reports
 Software Practice & Experience

NEWSLETTERS NON-CDC

Alabama
 Boston
 Brown
 California State University & Colleges
 CCN
 Dartmouth
 Data Pro in Education
 Delaware
 Florida University
 Hewlett Packard
 Illinois
 IPLRCC
 Kansas State
 Louisiana State
 Lovel
 Miami
 Michigan
 Missouri
 New Mexico
 New York (Binghamton)
 Nebraska
 N. Texas

N. Dakota
 Northern Illinois
 Oklahoma
 On-Line
 Op-Ed
 Pennsylvania
 Penn State
 (California) Perspective
 Oberlin
 Tennessee
 Toronto
 UMSL
 U.S. Naval Academy
 Vanderbilt
 Virginia Tech
 Waterloo (Canada)
 W. Virginia
 Wisconsin (Marquette)
 Wisconsin (Milwaukee)
 Washington
 QCPE (Indiana)
 York University

NEWSLETTERS CDC MACHINES

Arizona
 Colorado
 Calgary
 Cybernet
 Florida
 Florida State
 IMSL
 Indiana
 Iowa
 Lehigh
 Leicester
 London

Minnesota
 Montreal
 Nebraska
 New York
 Northern Illinois
 North Western
 OCS Georgia Inst.
 Purdue
 S. E. Missouri
 Texas (Austin)
 Virginia
 Washington

Appendix G

Manual Sales

Item	'76 Summer	'76 Fall	'77 Winter	'77 Spring	Total
User's Guide					
Intro	51	55	23	11	140
Vol. I	19	28	13	11	71
Vol. II	44	56	37	29	166
Vol. IV	59	73	57	46	235
Vol. VII	0	0	54	42	96
Vol. VIII	6	14	21	19	60
User Guide Supplements:					
MNF				73	73
Libedit	6	9	9	41	65
Pascal	6	1	4	0	11
FORTRAN	0	0	0	22	22
Remote Batch	0	0	18	6	24
CDC 6500:					
6000	2	3	0	1	6
AGOL	2	2	2	0	6
APEX I	2	1	0	0	3
APEX II	1	3	0	0	4
APEX III	0	1	17	5	23
APL	0	2	0	0	2
Basic	0	0	0	0	0
Basic 2.1	7	11	5	7	30
COBOL-4	17	20	9	9	55
COMPASS-3	8	7	9	2	26
Data Base Utilities	6	7	4	1	18
DDL Ref. Man.					
Vol. I	9	8	3	2	22
Vol. II	10	8	3	0	21
Vol. III	10	9	3	3	25
DMS-170	4	6	2	0	12
FORM	12	16	5	1	34
FORTRAN-4	26	34	36	19	115
FORTRAN Ext. Debug	5	4	4	3	16
Library Common (FCL)	2	0	0	0	2
Loader (Cyber)	6	14	8	4	32
Query Update	10	8	1	3	22
Record Manager Guide FORTRAN	4	6	3	3	16
Record Manager (Cyber)	6	13	8	3	30
Record Manager File Org. U.G.	3	7	3	2	15
Record Manager Guide COBOL	4	6	3	4	17
SCOPE Indexed Sequential	0	1	2	1	4
Sort/Merge-4	24	27	9	4	64
Update	15	9	21	10	55
SCOPE 3.4	10	12	9	4	35
8-Bit Subroutine	0	2	1	2	5
Data Base	1	1	3	0	5
Kwick	1	0	0	0	1
Mimic	1	0	0	0	1
Tegas	1	0	0	0	1
Antel Assembler	1	0	0	0	1

Antel Simulator	1	0	0	0	1
APPL I H B	1	0	0	0	1
Command Ref. Man	1	0	0	0	1
GIM 1	0	0	0	1	
CBM Ref. Man.	1	0	0	0	1
GPSS U.I.C.	1	0	0	0	1
Beginning U.G.	1	0	0	0	1
APPL Ref. Man.	1	0	0	0	1
GODAS Ref. Man. Vol. I	1	0	0	0	1
Vol. II	1	0	0	0	1
Vol. III	1	0	0	0	1
Vol. IV	1	0	0	0	1
Vol. V	1	0	0	0	1
Vol. VI	1	0	0	0	1
DMS Ref. Man.	1	0	0	0	1
COBOL-5 Ref. Man.	1	0	0	0	1
COBOL-5 U. G.	1	0	0	0	1
Magnetic Tape Sub.	1	0	0	0	1
Cyber Cross Sys.	1	0	0	0	1

MISCELLANEOUS:

MNF	0	2	5	7	14
Binders	31	33	52	30	146
Technical Bulletin No. 32	3	2	3	3	11
Technical Bulletin No. 33	3	3	3	10	19
Pascal Primer	4	10	8	2	24
Pascal User Manual	2	3	5	1	11
Electronic Music Synthesis	0	0	0	0	0
Adv. Graphing II Tek.	0	0	0	2	2
SPSS 2nd Edition	43	27	29	43	142

SPSS Supplements	0	11	141	58	210
Pocket Guides	100	206	59	151	516
Instruction Cards	01	00	00	00	01
Locker Rentals	43	105	74	60	282

Appendix H

Usage of Hustler Auxiliary Library Routines

BANNER	97,687	SHIPS	79
SPSS	44,865	COPYPLT	78
STATUS	28,843	CLEAN	78
IMSL	10,630	OLDPASS	75
STAT4	8,382	LISP	69
CCEXEC	7,936	ARCHIVE	61
PASCAL	5,477	SNOBOL	56
PROVIDE	5,285	TTT3	54
FCOPY	4,508	MATSLV	47
M6PL	2,951	SPIRAL	45
FILEDMP	2,856	AROWHD	41
EASYIN	2,203	FTFUNC	39
PAUSE	2,199	COPYLIB	33
PFTTY	1,953	SHADE	31
APEXII	1,808	LIBPL	30
FNTS	1,635	ALGOL	28
TEK	1,522	HALPFUL	28
TEK INDEX	1,514	PIGLAT	26
TEKTRONI	1,508	WORDS	25
INDEX	1,221	ALGOLC	25
PLOTQ	1,030	IN1CP	24
WRITER	999	EXPI	23
CONTROL	932	ALGLIB	23
APEXI	826	KWIC	19
HANGMAN	647	ICSSMU	19
MNF	608	FUNPACK	18
GASP	527	EULER	18
GCS	477	BKPT	16
BIGPRNT	410	PERTTIME	15
DASHLN	354	POLAREA	14
AXIT	343	RTN	11
EIGEN	317	RITZ	11
APEX	299	FTKALM	10
GRID	280	SNOBLOC	10
GMPRD	268	RANDU	10
CREDIT	216	LGM	9
CALTEK	210	GSILOT	9
EISPACK	177	FTFUND	9
BESJ	171	FTN3	8
DOCUMENT	163	DE1SP	8
LLSQAR	156	DE1DP	8
TAPES	139	GASPIV	7
SIMQ	132	BECVM	6
AUDITTY	119	SIMULA	6
SO1SP	115	SIMULAC	5
BAR	112	SIMLIB	5
BESK	102	RETRN	5
NEWHLP	98	PUSH	5
BESI	93	POLY	5
PULL	91	SPIV	4
BESY	91	RATES	4
APLSIG	87	POLAR	4
SUGGEST	86	GMADD	4
ELLIPS	85	DREBS	4
SPURT	80	LOCSUB	3

CHUCK	3
NETFLOW	2
SPUR	1
OFSCCR	1
NDTR	1
MIMIC	1
IFCONCV	1
IFBND	1
GMSUB	1
CDTR	1
ARRAY	1

Total	246,234
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Appendix I

Applications Programming Project Summary

ON CAMPUS:

Department and Projects	Amount
Accounting & Financial Administration	\$,375.00
CRSP Data Analysis Contract, Compustat-CRST, etc.	
Miscellaneous AFA projects	
Animal Husbandry	2,370.00
Beef production	
Wisconsin Beef Analysis Program	
Modify Sheep System	
Feed Unit Inventory	
Statistical Analysis	
Audiology & Speech Science	50.00
Audio and Speech Statistics	
Botony & Plant Pathology	110.00
Correlations	
Further analysis of Leaf Data	
Chemistry	1,550.00
Exch Spectra Analysis	
File Structures	
Student Reporting System	
College of Natural Science	2,200.00
Research Reporting System	
Grad Assistant Reporting	
Continuing Education Library	811.00
Document Retrieval System	
NEAU mailing list	
Continuing Education	361.00
Statistical Analysis of Questionnaire	
Registered Nurses Data	
Cooperative Extension	2,205.00
Horse Bowl Question Database	
Tel Awards System	
Horse Show analysis	
Modifications to Programs	
New program work	
Crop & Soil Science	5,512.68
Label runs	
Modifications to existing programs	
Corn Hybridization System	
Wheat Hybridization System	
Potato Crop Yields	
Sugar Beet Analysis	

Cyclotron Lab		112.00
	Tape Copy	
Dean of Engineering		647.63
	Engineering Advisor Evaluation	
	Committee listing	
	Engr. Bldg. Key Reporting System	
	Labels	
	MSPE	
	Program Maintenance	
	Room Listing	
	Teaching Load Summary	
Economics		2,953.00
	Prisoner Release Study	
Educational Institute of HMA		3,325.00
	Correspondence School Records System	
	Production Runs	
	Special HMA runs	
	HMA Program Maintenance	
	HMA Program Development	
Fisheries & Wildlife		50.00
	Analysis of Fish Data	
Food Science		174.00
	AOV	
Forestry		668.00
	Tree Survey	
	AOV	
Human Development		1,828.00
	Sex Study	
	AOV	
	Multiple Regressions	
	Diagnostic Mgmt. Program (DMP)	
	Rater Reliability	
Industrial Education		90.00
	Secondary School Questionnaire	
Lecture Concert		1,372.83
	Creation of LCS Cheshire Label System	
Management		629.00
	Industry Plot	
	Industrial Survey	
Pharmacology		1,455.00
	Rat Analysis	
	Copy Master	
	Test Preparation System	
	Letter Writing System	
	CAI Assistance	

Poultry Experimental Station	150.00
Least Cost Feed Program	
Public Safety	1,922.00
Labels run	
Radiation Dosage System	
Isotope Inventory System	
Research Development	2,531.00
Grant Data System	
Program Maintenance	
Program Development	
Cheshire Labels	
Survey Data Analysis	
Safety Service	615.00
Accident Report	
School of Labor & Industrial Relations	76.00
SLIR Data Base	
School of Nursing	523.00
Care to Hypertensives Study	
Sociology	1,005.00
Residential Segregation	
Student Activities	198.00
ASMSU Elections	
Telfarm	481.94
Labels	
USDA - Crop Science	646.00
Sugar Beets	
Vet Medicine Large Animals	169.00
Herds of Cattle AOV	
Miscellaneous	2,891.69
Labels Production	
Census Maintenance	
Census Consulting	
Car Pool	
Income Expense and Telephone	
Instructing use of terminal	
Special Computer Lab reports	
Accounting System	
Program Development and Maintenance	
TOTAL ON-CAMPUS	\$41,333.18

OFF CAMPUS:**STATE GOVERNMENT**

Department and Projects

Management & Budget

State Budget Report

Highway

Population Projections

Education

Bridge Rating

Juvenile Justice Service

Criminal Statistics

Commerce, Changing Econ.

Arrest Records Stats

Michigan State Housing Development Authority

Census Assistance & Analysis

Traffic Study

Department of Mental Health

OEE/Census

Commission on Indian Affairs

Vital & Health Statistics

State Police

Traffic Study

TOTAL STATE GOVERNMENT

\$22,742.86

NON-PROFIT ORGANIZATIONS:

Organization and Projects

Tri-County Regional Planning Commission

CBF/DIME System

Mental Health Needs Methodology Study

Branch County - MHNI

Census Display and Analysis

Capital Area CHPC

Payroll System

ECMCHPC

Budget System

Kalamazoo Community Mental Health Board
RDI Reports and Plot
Water Quality Analysis

MARMP - Administration
Housing Information System

CHPC Maintenance
Analysis of Objective Data S

Waverly Schools
AOV

Lansing Tri-County Manpower Administration
Parishioners Labels and Information GBF/Dime and Mail System

WMSRDS
Analysis of Church Survey

Genesee County Met. Planning Co.
Softball Registration for Michigan
Educational Analysis

United Methodist Church
Labels Production

MRPA
Creating Reports by Zip

Beta Alpha Psi
Census Data Copy

Pine River Canoe Camp
HMA, Population Projection

St. Johns Parrish
County Birth Rates

Bath Chapter Twp.
Census Data Analysis

City of Alma
Statistical Runs

City of Cadillac
School District Data

City of Portage

City Clerk, Grant, MI

Department of Community of Development

Michigan Township Assn.

University of New Brunswick

Nothorn Michigan University

Region 2 Planning Commission

St. Joseph City Commission on Ageing

S.W. Michigan Regional Planning Commission

W. Michigan Shoreline Regional Dev. Commission

MSPA

TOTAL NON-PROFIT

\$13,443.95

PRIVATE ORGANIZATIONS:

Organization and Projects

Learning Systems Inc.

Statistical Analysis

Holmes/Black Architects

Project/Alpha List

Sullivan & Shook

Educational Specifications System

McLavy & Sons

Analysis of Hospital Questionnaire

Wightman & Assoc., Inc.

HEC2 Analysis

Leonard Bronder

Least Squares Market Data

Medical Business Service

Blue Cross/Shield Tapes

Jim Hill

Statistical Analysis

William Ralls

Mailing List

National Bank of Jackson

Census Data Analysis

Gobe Associates

Census Tables File: C

Lake States Assoc., Inc.
Membership & Labels

Williams & Works
Corporate Analysis

Fishbeck, Thompson, Carr & Hube

MSPE

Dr. Robert Freeman

TOTAL PRIVATE \$ 4,129.50

GRAND TOTAL \$81,649.49